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Age Changes in the Acid-Base Equilibrium of the Blood of Males

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AN INVESTIGATION OF THE ACID-BASE EQUILIBRIUM OF THE BLOOD OF 152 MEN (40 TO 89 YEARS OF AGE) REVEALS THAT NORMAL BALANCE CAN BE MAINTAINED UNDER RESTING CONDITIONS IN SPITE OF REDUCTION IN KIDNEY FUNCTION.

PREVIOUS studies from this laboratory have indicated that with increasing age there is a significant impairment of the physiologic capacities of the kidneys which may be detected before clinical signs of kidney disease are manifested (1, 8). Since one aspect of the acid-base equilibrium of the blood is regulated by the kidney tubules, the following study was undertaken to determine whether old age had any effect on the daily regulation of the acid-base equilibrium of the blood under resting conditions. Differences in day-to-day variability of the acid-base equilibrium of the blood of old and young subjects were also determined.

EXPERIMENTAL METHODS

Subjects.—Determinations of the acid-base equilibrium of the blood under resting conditions were made on 152 males between the ages of 40 and 89 years. All subjects were ambulatory patients from the Infirmary Division (Old People's Home) of the Baltimore City Hospitals. All patients were free from clinical signs of edema or cardiac decompensation and had no history or signs of renal disease. Both white and colored subjects were studied. In addition 10 male laboratory personnel aged 29 to 42 (Mn = 31.9 years) and 10 older subjects aged 63 to 89 (Mn = 76.3 years) were tested daily for ten days.

Experimental Procedure.—Samples of capillary blood were drawn anaerobically on two days at an interval of two to three weeks. Determinations of pH of the serum (pH_s) per cent red cells (V_c) and total carbon dioxide content ($[CO_2]_b$) were made by the micro method of Shock and Hastings (10). The CO_2 tension of arterial blood (pCO_2) and the bicarbonate content of the serum ($[BHCO_3]_s$) were calculated from a nomogram (4). The average of the two tests was computed for each variable and these values were used in calculating means and their standard errors for each age decade.

Coefficients of correlation between tests on two different days were computed for each variable to estimate the stability of the determinations.

The observations made on ten successive days on old and young subjects were subjected to an analysis of variance (14). The estimate of error was based on the sum of squares remaining after the subtraction of the sum of squares for age, subjects, and days from the total variance.

RESULTS

Retest Correlation Coefficients.—Repeat determinations (two to three weeks) showed closest agreement for V_c (r = .84) and lowest for pH_s (r = .36). The correlation coeffici-

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ents did not change systematically with age (table 1), and there was no evidence of greater daily fluctations in the elderly subjects than in the younger ones.

TABLE 1. CORRELATION COEFFICIENTS FOR OBSERVATIONS OF ACID-BASE EQUILIBRIUM OF BLOOD TESTS ON DAY I AND DAY II

Variable	Age Groups (Years)				
	40–59	60–69	70–79	80–89	Total
Vc	.90	.72	.84	.80	.84
pHs	.43	.14	.47	.56	.36
$[CO_2]b$	.68	.72	.50	.91	.68
pCO_2	.64	.65	.48	.59	.59
$[BHCO_3]s$	.73	.69	.51	.92	.68
N	36	54	45	17	152

Analysis of Variance.—The analysis of variance of 10 consecutive daily observations on 10 old and 10 young subjects revealed that in this sample daily variations were no greater than expected by chance in all variables, that age variation was significantly greater than the estimate of error in V_c, pH_s, $[CO_2]_b$ and pCO_2 but not in $[BHCO_3]_s$, and that subject differences were significantly greater than the estimate of error in V_c, $[CO_2]_b$, and pCO_2, but not in pH_s or $[BHCO_3]_s$ (table 2).

TABLE 2. SOURCE OF VARIANCE IN DETERMINATIONS OF THE ACID-BASE BALANCE OF THE BLOOD (10 CONSECUTIVE DAILY OBSERVATIONS ON 10 OLD AND 10 YOUNG SUBJECTS)

Source of Variance	Level of Significance of Variable Per Cent				
	Vc per cent	pHs at 38 C	$[CO_2]b$ mM/1	pCO_2 mm.Hg.	$[BHCO_3]s$ mM/1
Age	1	1	1	1	>5
Subjects	1	>5	1	1	>5
Days	>5	>5	>5	1–5	>5

No significant differences between the daily variation of young and old subjects were found in any of the variables measured.

Age Trends.—In the total sample of 152 subjects, average values for percentage cells (V_c) diminished from 0.478 ± .022 (all mean values are followed by ± 1 standard error of the mean) at age 40 to 49 to 0.415 ± .007 at age 80 to 89. The average pH_s dropped from 7.400 ± .003 to 7.368 ± .010 between the ages of 20 to 29 and 80 to 89 (table 3). Age trends are shown for all measurements in figure 1. The verticle lines through each point indicate ± 1 standard error of the mean.

A significant correlation with age was observed in measurements of cell volume ($r = -0.29$) and pH_s ($r = -0.20$). Measurements of pCO_2, $[CO_2]_b$, and $[BHCO_3]_s$ did not change significantly between the ages of 40 and 89 years ($r = +.05, -.03$, and -0.10 respectively).

In 34 of the subjects determinations of glomerular filtration rate (inulin clearance), effective renal plasma flow (diodrast clearance), and maximum excretory capacity of the tubule (diodrast T_m) were also made within

six months of the estimates of acid-base balance (1). The highest correlation observed was between $[CO_2]_b$ and diodrast T_m ($r = 0.34$). The correlation between $[BHCO_3]_s$ and diodrast T_m was 0.30. All other correlations between pH_s, $[CO_2]_b$, $[BHCO_3]_s$, and the measurements of renal function were low (0.10 to 0.26). However, with an N of 34 none of the correlations were significant at the 1 per cent level.

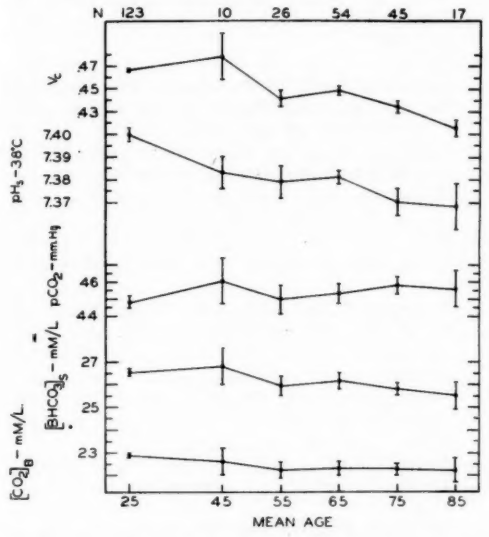

FIG. 1. Trends in the acid-base equilibrium of the blood of males with increasing age. Average curves from top to bottom include per cent red cells, serum pH at 38 C., carbon dioxide tension expressed in millimeters of mercury, serum bicarbonate, and blood carbon dioxide content both expressed in millimoles per liter. The vertical lines indicate ± 1 standard error of the mean. Data for the 25 year determinations taken from Hamilton and Shock (3).

DISCUSSION

The observed reduction with age in percentage of red cells (V_c) in the blood is in agreement with some previous reports (2, 6), although at variance with others (5, 7, 15). Since the subjects studied had been maintained on an adequate diet for periods of 1 to 10 years prior to the test, it is probable that the reduction in V_c represents an age change rather than a nutritional deficiency. Unfortunately, we have no knowledge of the nutritional requirements for aged people.

When the observations were plotted on triaxial coordinates (12), it was found that the average values for all age groups fell well within the normal area previously observed in young adults.

Although glomerular filtration rate, effective renal plasma flow, and T_m (diodrast) were significantly reduced (35-45 per cent) in elderly subjects, the acid-base equilibrium of the blood was maintained within normal limits. Thus it appears that normal acid-base equilibrium of the blood can be maintained, at least under resting conditions, in spite of marked

TABLE 3. MEAN ACID-BASE BALANCE OF THE BLOOD IN MALES ACCORDING TO AGE

Age (Years)	N	Vc Per Cent		pHs at 38 C		$[CO_2]b$ mM/L		pCO_2 mm. Hg.		$[BHCO_3]s$ mM/L	
		Mn	σMn	Mn	σMn	Mn	σMn	Mn	σMn	Mn	σMn
20–29*	39	.475	.005	7.399	.010	22.30	.19	43.38	.59	26.20	.23
20–29†	123	.466	.001	7.400	.003	22.88	.12	44.78	.33	26.55	.15
40–49	10	.478	.022	7.383	.007	22.63	.542	46.06	1.37	26.80	.758
50–59	26	.441	.007	7.379	.007	22.25	.367	44.99	.902	25.96	.432
60–69	54	.448	.004	7.381	.003	22.32	.301	45.33	.617	26.17	.356
70–79	45	.434	.005	7.370	.006	22.29	.226	45.82	.564	25.79	.272
80–89	17	.415	.007	7.368	.010	22.21	.538	45.62	1.049	25.53	.605

* Data from Shock and Hastings (11).
† Data from Hamilton and Shock (3).

reductions in kidney function as determined by clearance methods.

The lack of significant age differences in the daily variations in acid-base equilibrium is evidence that elderly subjects retain their homeostatic capacities with respect to this function and are able to adjust to the daily demands for adequate excretion of acid or alkali. Preliminary studies indicate impairment of these regulatory mechanisms under conditions of physiologic stress (13).

Summary

Determination of the cell volume (V_c), pH_s, and total CO_2 content ($[CO_2]_b$) of the blood were made on two different days on each of 152 ambulatory males who were between 40 and 89 years of age. The pCO_2 of arterial blood and the $[BHCO_3]_s$ were computed. In addition similar observations were made on ten successive days on 10 young (age 29 to 42) and 10 old (63 to 89) subjects. A significant reduction in V_c and pH_s was observed with age. Age changes in pCO_2, $[CO_2]_b$, and $[BHCO_3]_s$ were not statistically significant. There was no significant relationship between depressed renal function (glomerular filtration rate, effective renal plasma flow, and T_m diodrast) as measured in 34 of the subjects and alterations in the acid-base equilibrium of the blood under resting conditions.

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References

1. Davies, D. F., and Shock, N. W.: Age Changes in Glomerular Filtration Rate, Effective Renal Plasma Flow, and Tubular Excretory Capacity in Adult Males, *J. Clin. Invest.* (in press).
2. Fowler, W. M., Stephens, R. L., and Stump, R. B.: The Changes in Hematological Values in Elderly Patients. *Am. J. Clin. Path., 11:* 700-705, 1941.
3. Hamilton, J. A., and Shock, N. W.: An Experimental Study of Personality, Physique, and the Acid-Base Equilibrium of the Blood. *Am. J. Psychol., 48:* 467-473, 1936.
4. Hastings, A. B., and Shock, N. W.; Studies of the Acid-Base Balance of the Blood. II. A Nomogram for Calculations of Acid-Base Data for Blood. *J. Biol. Chem., 104:* 575-584, 1934.
5. Isaacs, R.: *Hal Downey's Handbook of Hematology,* Paul B. Hoeber, Inc., New York, 1938, *1,* p. 5.
6. Newman, B., and Gitlow, S.: Blood Studies in the Aged. The Erythrocyte in the Aged Male and Female. *Am. J. Med. Sc., 205:* 677-687, 1943.
7. Olbrich, O.: Blood Changes in the Aged. *Edinburgh Med. J., 54:* 306-321, 1947.
8. Shock, N. W.: Kidney Function Tests in Aged Males. *Geriatrics, 1: 232-239,* 1946.
9. Shock, N. W.: The Acid-Base Balance of the Blood of Aged Males. *Federation Proc., 6:* 200, 1947.
10. Shock, N. W., and Hastings, A. B.: Studies of the Acid-Base Balance of the Blood. I. A Microtechnique for the Determination of the Acid-Base Balance of the Blood. *J. Biol. Chem., 104:* 565-573, 1934.
11. Shock, N. W., and Hastings, A. B.: Studies of the Acid-Base Balance of the Blood. III. Variations in the Acid-Base Balance of the Blood in Normal Individuals. *J. Biol. Chem., 104:* 585-600, 1934.
12. Shock, N. W., and Hastings, A. B.: Studies of the Acid-Base Balance of the Blood. IV. Characterization and Interpretation of Displacement of the Acid-Base Balance. *J. Biol. Chem., 112:* 239-262, 1935.
13. Shock, N. W., and Yiengst, M. J.: Experimental Displacement of the Acid-Base Equilibrium of the Blood in Aged Males. *Federation Proc., 7:* 114, 1948.
14. Snedecor, G. W.: *Statistical Methods,* 4th Ed. Iowa State College Press, Ames, 1946.
15. Wintrobe, M. M.: Blood of Normal Men and Women. Erythrocyte Counts, Hemoglobin, and Volume of Packed Red Cells of 229 Individuals. *Bull. Johns Hopkins Hosp., 53:* 118-130, 1933.

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Growth and Regeneration Rates in Relation to Age in the Crustacea

With Special Reference to the Isopod, *Asellus aquaticus* (Linn.)

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DATA ARE PRESENTED ON INCREMENTS IN VARIOUS LINEAR DIMENSIONS OF THE BODY AND ON GROWTH AND REGENERATION RATES AS A FUNCTION OF AGE IN THE ISOPOD CRUSTACEAN, ASELLUS AQUATICUS, AND THE CONCLUSION IS DRAWN THAT GROWTH AND REGENERATION RATES DECLINE WITH AGE AND THAT INDEFINITE GROWTH DOES NOT OCCUR.

ACCURATE and detailed records of the normal growth rate of Crustacea in relation to age, as of the invertebrate animals in general (7, 8, 15, 43, 53), form an insignificant fraction of available information on the subject of growth because of the difficulty and tedium of collecting careful records of age. Animals must be isolated or otherwise labelled and kept alive for observation and measurement over very long periods. Little is known even of the longevity of Crustacea (45, pp. 236, 475, 533, 637, 748, 955), as well as of other invertebrates (51). The life span of the American lobster is given as 50 years (29), that of the crayfish as 15 to 20 years (36), while that of the shore-crab, *Carcinus,* is probably much less (11, 76). Isopod Crustacea live for 2 to 5 years (14, 45) or less (32, 56), Mysids for about 2 years (6), while the smaller Crustacea, Cladocera (2, 4) and Ostracoda (69) are proportionately more short-lived. Longevity bears a general relation to size. Both growth rate and life span are greatly affected by the rate of food intake in Cladoceran Crustacea (39) and would therefore appear to be interdependent.

The best records of growth in Crustacea are those on the crayfish, *Potamobius,* (71), the lobster, *Homarus,* (20, 29, 30, 52), the edible crab, *Cancer,* (49, 62), the shore-crab, *Carcinus,* (70, 76) and other Decapod Crustacea (52, 75, 77), Euphausid Crustacea (22), and the water-fleas, Cladocera, (2, 18, 39, 40). Lebour (47) gives good records of the growth of the larvae of Decapod Crustacea, together with a full list of references, and other investigations (5, 9, 31, 37, 48, 60) give some measurements of growth rate in relation to age. Most of these are records of individual animals; others (70) give mean figures for a group of animals.

Mathematical relations between size and age have been derived for the lobster (73) and for the water-flea (18). This contrasts with the large number of attempts to fit algebraic relations to the growth of vertebrates (81).

The paucity of data on absolute growth in relation to time in Crustacea contrasts with the wealth of records (33, 34, 68) of differential growth, where a standard measurement of the body is used as a substitute for time. The growth of other measurements relative to this standard may be determined without any knowledge of time or age.

By making the assumption that body size is an approximate measure of age (ignoring the exact relation between size and age) some estimate of growth rate in relation to age may be obtained without keeping individuals under observation for long periods. Observations may be made of a representative sample of individuals covering the known range of body size of the species, each individual contributing only a single reading and the whole of the readings pooled to give a picture of growth rate over the whole size range.

In Crustacea this method is particularly simple since the increase in size observed be-

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tween the shell which is cast in the process of moulting and the new shell formed after moulting represents the true growth during the interval since the previous moult (this interval will be referred to as the duration of the stadium (38, p. 188)). The growth rate over this relatively short period is thus easily computed.

Records of this type are relatively abundant (1, 3, 8, 13, 21, 23, 24, 25, 27, 32, 35, 41, 46, 57, 58, 59, 66, 67, 69, 72, 79), particularly covering the early period of life, since larvae are reared easily and rapidly through a number of stadia in the laboratory. Unfortunately many of these records do not include the duration of the stadia, being intended merely as a supplement to the qualitative description of successive instars (the form of the animal in successive stadia (38, p. 188)) or to test, on other Crustacea, the observation of Brooks (10) that linear measurements in Stomatopod Crustacea tend to increase by a constant factor of 5/4 (= 1.25) at each moult (Brooks' Law).

The present data therefore constitute a significant addition to a somewhat meagre body of knowledge of growth rate in relation to age in Crustacea.

Data on the variation of regeneration rate of parts of the body with age or with body size in animals in general (19; 44, p. 655) and specifically in Crustacea (16, 61, 78, 80) are even more scanty than those on growth rate. In the Crustacea the amount regenerated in one stadium rather than the actual regeneration rate is usually given (78) and variations in duration of the stadium are disregarded. The variation with age in the mean rate at which a structure regenerates, which is the present centre of interest, must be clearly distinguished from the variation of regeneration rate with time during the course of a single act of regeneration. Data on the latter are relatively abundant (61 for references).

Methods

The present records are chiefly of growth and regeneration in the Isopod Crustacean, *Asellus aquaticus* (the fresh-water slater), in relation to age (tables 1 to 4), but in table 5 are added measurements of a well known (11) and very extensive series of moults of an individual shore-crab, *Carcinus maenas*, collected and dated by Mr. Waddington of Bournemouth and now in the possession of the British Museum (Natural History). This series was incomplete (table 5) when Williamson (76) published measurements of other individuals reared by Waddington and the data do not appear to have been published subsequently. They have already been used for another purpose (55, individual no. 1) and provide an unusually complete record of growth in relation to age.

The records of growth and regeneration in *Asellus* are of three types (i) original records of the growth of various measurements of the body during one particular stadium in 2 selected individuals (table 2, A) and of the growth in abdomen width and limb length during one stadium in a number of individuals of varying body size (table 2, B); (ii) original records of the growth in abdomen width and body length and the rate of regeneration of 2 selected thoracic limbs in 2 individuals over 10 successive stadia (and 10 repetitions of the act of regeneration) (table 1); and (iii) estimates (56) of mean growth rate in abdomen width and mean regeneration rate of a selected thoracic limb as a function of body size, obtained from 670 individual records, each covering a single stadium. All three classes of records permit an estimate of growth rates and of regeneration rates in relation to body size since the duration of the stadia is recorded and classes (ii) and (iii) further permit an

estimate in relation to age, the age at the beginning of the records being estimated (56) by extrapolation.

Analysis of the Data

Growth of the Individual Carcinus.—The geometric rate of increase of length and width of the shell (the carapace) at moulting is seen (table 5) to be very constant in this individual, in agreement with Brooks' law, and moreover, the factor of increase is very near 1.25. (in this table and elsewhere the factor is referred to as the Przibram factor (P. f.) since Przibram made much use of it (63, 64, 65) and attempted to explain its significance. The discrepancy in the last stadium may perhaps be dismissed as pathologic. There is no significant trend in the value of the factor with age, in contrast to the condition in *Asellus* (tables 1, 3). The constancy is remarkable in view of the very variable duration of the stadia (caused by the interaction of season and age). In assessing the constancy of the factor it must be remembered, of course, that the maximal possible variation of the factor is very limited: for instance its variation between 1.00 and 1.26 corresponds to the variation between no increase in size at all and a doubling of the volume of the body, so that the factor tends to minimise variations in growth at moulting. Nevertheless the P. f. is clearly much more constant in this *Carcinus* than in *Asellus* and in some other Crustacea (12, 26, 67, 79). The factor is higher than 1.26 throughout (c.f. 21, 27). It is somewhat higher for width than for length growth (c.f. 35, 55).

The duration of the stadia increases progressively, if irregularly, with age, so that although the P. f. remains constant the specific growth rate, that is, the increment per unit of body size per unit time (*i.e.*, the P. f. divided by the duration of the stadium), decreases progressively throughout life. The specific growth rate (s. g. r.) is usually regarded as the most significant measure of growth rate. Typically (50), as here, it decreases throughout life. It is also typically associated with a sigmoid graph relating size to age, that is to say, during the preinflectional phase the growth curve is convex towards the time axis and the arithmetic rate of growth increases with time. The size/time graph for this individual *Carcinus* is entirely preinflectional (the animal having presumably died very prematurely) and gives a very false impression of an indefinitely accelerating growth rate which, however, is belied by a knowledge of the s. g. r. (table 5).

Growth of Asellus.—Before considering the main trend of growth rate with age in this species, the extent of minor variations and irregularities both in the P. f. and in the s. g. r. is noteworthy. The two individuals of table 2, A represent opposite extremes in the range of individual variation. Any age-dependent (or size-dependent) trend in growth rate (g. r.) is therefore obscured in a random small sample (table 2, B) by this individual variation. Even among litter mates, as in the better known groups of animals (mammals), growth rate varies considerably under identical environmental conditions. Thus the abdomen width of the 13 survivors of a particular brood at 78 days after release from the brood-pouch varied between 0.5 and 1.6 mm., the mean growth rate of the latter being four times that of the former.

Again g. r. varies irregularly throughout a series of moults in one specific individual (table 1), presumably because of temporary variations in conditions, although a general age dependent trend in g. r. is also evident. A complete though temporary halt in growth has been observed frequently in this species, while in old individuals' growth typically ceases (in the laboratory) and there may even be degrowth (a decrease in size, c.f. 40). Degrowth may also occur in younger indivdiuals: P. f. value less than unity are then obtained (tables 1, 2 A, 2 B).

Different measurements in a single individual at any one time show a variable g. r. (table 2 A,) because of differential growth (54). The P. f. thus shows a graded change along the body in the individual animal corresponding to the graded variation in growth rate observed in the mean population data (54).

With allowance for these variables there is clear evidence (tables 1 to 3) that growth rate declines with age in *Asellus*. In the laboratory population (table 3) the mean s. g. r. declines progressively with age. Above 50 units abdomen width (as the measure of body size) the gross increment at each moult is virtually constant. This constant arithmetic rate of increase may be contrasted with the constant geometric rate in *Carcinus* and would imply a progressive decline in s. g. r. even were the stadia of constant duration. In fact, however, the mean duration of the stadium increases progressively, and considerably, with age and both s. g. r. and the P. f. therefore decline very rapidly with age.

An age-dependent (a size-dependent) decline in g. r. both for abdomen width and for limb length seems evident, in spite of individual variability, even in the small sample of males in table 2, B although there is no clear trend in the sample of females. The decline is very clear (table 1) in the growth of two individuals over a series of moults. There is a progressive decline in the P. f. which implies an even greater decline in s. g. r. since, again, stadium duration increases with age, even if irregularly.

In these two individuals (table 1) there is a general correlation between the growth rates (the P. f. values) for abdomen width and body length throughout the vicissitudes in rate. It is also of interest that while g. r. (P. f.) is generally higher in individual no. 1 than in no. 2 (at least in the earlier stadia) the reverse is true of specific regeneration rate (s. r. r.), so that there would appear to be some degree of independence between growth and regeneration.

In *Asellus* the P. f. is rarely greater than 1.26 and usually much less. Values greater than 1.26 are not uncommon and there is probably considerable specific variation among Crustacea.

Regeneration in Asellus.—The data on regeneration rate as a function of body size (table 4) were obtained from the same population as those on growth rate (table 3). While the gross increment in body size per stadium is virtually constant in age, the length of limb regenerated in one stadium increases progressively, and is virtually a linear function of body size (abdomen width) (56), as in the records of Dawes (16). The length regenerated per unit of abdomen width during the stadium (the specific increment per stadium) is thus approximately constant. However, the specific regeneration rate (s. r. r.), that is, the specific increment per day, declines with age, owing once more to the progressive increase in duration of stadium. The age-dependent decline in s. r. r. is of course less rapid than that in s. g. r. The gross length of limb regenerated in one stadium at any body size is roughly proportional to the total length to be regenerated, that is, to the length of the normal limb at that body size, and regeneration-rate is therefore approximately the integral of growth rate.

In specific individuals (table 1) the same features of regeneration are observed: namely the increase in gross length regenerated per stadium and the decrease in s. r. r. with age. In individual no. 1 there appears to be a temporary recuperation in s. r. r. during the fourth and fifth repetition. This phenomenon is studied in more detail elsewhere. It is probably an effect of repeated regeneration in the individual. The relative rates of regeneration of third and eighth pair of limbs remains very constant through the vicissitudes of absolute rates.

The rate of decline with age of both g. r. and r. r. itself declines with age (50, p. 167). This is true also of growth in *Carcinus* (table 5) and of other Crustacea and is no doubt characteristic of growth in animals (50).

Discussion

Growth Rate.—The present data may be assimilated to previous knowledge to give a consistent picture of growth in relation to age in Crustacea. Both in *Asellus* and in *Carcinus* the specific growth rate (s. g. r.) declines monotonically (50, p. 165) throughout life, and this is found to be true of other Crustacea where adequate data (70) are available. The growth of Crustacea therefore re-

sembles that of animals in general (50, p. 167) and, as also in general, the rate of decline in s. g. r. itself declines with age.

The growth curve, that is the relation between the magnitude of a selected measurement and age, is typically sigmoid in Crustacea (40), again as in other animals (50, fig. 1). Thus, while the geometric rate of increase in magnitude (that is, the s. g. r.) declines monotonically throughout, the arithmetic rate increases at first to a maximum at the point of inflection of the curve, after which it declines to zero at the maximum body size. Where, as in the individual *Carcinus,* death occurs relatively early, the post inflection portion of the curve may be absent, giving a spurious impression of exponential growth which, however, the declining s. g. r. shows to be false. Over the middle portion of the curve the arithmetic rate of increase may be virtually constant, as for instance over part of the size range studied (56) in *Asellus.* The growth-curve derived from these data, however, clearly reveals the approach to a limiting size and to a zero growth rate which is implied in the declining s. g. r.. The growth curve of the lobster (20) and that derived from the data of Pearson (62) on the edible crab, also show the post inflectional portion of the typical curve very clearly. These large Crustacea would, like the smaller Isopods and Cladocera, undoubtedly reach a limiting size if chance (51) permitted.

The current view (34, p. 40) that growth of the larger Crustacea, as also of fishes (28, 42), is indeterminate possibly leads to the unwarranted assumption that there is no approach to a limiting size (to zero growth rate) in these animals, and possibly even that growth rate does not decline with age. However both J. S. Huxley (34, p. 40) and T. H. Huxley (36, p. 31) are explicit that g. r. does decline with age and Thompson (74, p. 184) describes the animal of indeterminate growth as approaching asymptotically, however late in life, an upper limit to size. The difference from the animal with determinate growth is quantitative, not qualitative: the growth curve of the latter approaches the upper asymptote relatively early in life, while the former may approach its limiting size, at an age which is beyond the normal expectation of life in the field (51). This is no doubt expressed graphically by the relatively prolonged postinflectional portion of the growth curve in these large Crustacea (20, fig. 1).

The sigmoid curve allows considerable latitude in the choice of an empirical algebraic relation to define it (18, 73). Growth and longevity are related (39) and the *Crustacea* are thus not potentially immortal. Their growth shows the same properties of aging as that of other animals. The form of the growth curve and the monotonic decline in s. g. r. is sufficiently universal among animals to be regarded as normal and the further assumption that it has universal adaptive significance seems justified. In no group of animals does it seem probable that completely unlimited growth could be biologically advantageous. In the Crustacea, certainly, the problems of maintaining adequate mechanical support (74, p. 52), particularly during moulting, impose a strict limit to useful size increase. The abundant evidence from both malignant and in vitro growth that tissues have potentially unlimited powers of growth scarcely permits any other interpretation of the normal suppression of these powers in organised individuals. Any attempt to restore growth, in an adult animal with determinate growth, is therefore biologically unethical.

Evidence such as that of Ingle (39) that growth rate and longevity are closely interdependent implies that the relation between growth rate and age is more than incidental. The relatively slow growth of the human individual thus receives its explanation in the relatively long life span. It seems further probable that life span of a species may itself be a biologically adaptive feature. Animals are characterised by their life span as much as by their other characters, and life span varies considerably with type of animal even within the class Crustacea. Biologically, therefore, it may be unethical to attempt to modify life

span, although this does not necessarily imply that the attempt is socially inexpedient.

In sharp contrast to the normal gradual decline in growth rate is the brief and rapid decline preceding death (tables 1, 5). This might well be regarded as pathologic. Further, old individuals of *Asellus* and of other Crustacea give an impression of decrepitude which, however, is not amenable at present to quantitative estimation.

A monotonically decreasing s. g. r. is not inconsistent with a constant factor of increase (P. f.) at moulting. Indeed in this individual *Carcinus,* and in other Crustacea, it might seem that moulting is determined by this constant multiplicative increase in size in such a way that the duration of the stadium keeps pace with the declining rate of growth. Such a control of moulting by growth has been noted previously (56). Brooks' law undoubtedly has a wide application to the growth of Crustacea (63) and of insects (17).

Przibram (64, 65) believed that the factor of increase in linear measurements was not 1.25, as suggested by Brooks, but 1.26, that is $3\sqrt{2}$, implying a doubling of the volume at each moult. The significance of any such precise factor, however, depends on its universality. In fact, the factor frequently differs (12, 26, 67, 79) from this value. In the *Carcinus* individual (table 5) it is relatively constant for each measurement (length and width of the shell) but differs between the two and in both it is greater than 1.26 (c.f. 21, 27). In *Asellus* the factor is rarely as high as 1.26 and it therefore varies between species. It also varies between individuals of *Asellus* (table 2 B), and between different measurements of one individual at one and the same moult (table 2 A). As in other Crustacea (26, 59, 67) it decreases with age for a specific measurement in one individual. By contrast an increase with age in early life has been observed in Ostracods (69).

Regeneration Rate.—The gross length of limb regenerated in one stadium by other Crustacea increases (61, 16, 78, 80) with age (or with body size) as in *Asellus.* The rate of this increase is roughly proportional to that of the normal nonregenerating limb but possibly rather greater in some Crustacea (33, 78, 80) and somewhat less in other (16, 61), as in *Asellus* (56). The decline with age in s. r. r. observed in *Asellus,* again, is probably general among Crustacea, although in *Portunus* (the swimming-crab) the duration of the stadia does not increase significantly over the size range studied by Zeleny (78) and s. r. r. therefore does not decline with age over this range. This serves to stress the quantitative difference between g. r. and the much higher regeneration rate in Crustacea, the adaptive significance of which has been indicated. This difference stresses once more that the normal decline in g. r. is not so much an unavoidable concommittant of senescence as a positive adaptational acquisition. An ultimate decline in regeneration rate with age, though less marked than that in g. r., is probably characteristic of all animals (44, p. 655).

Summary

1. Adequate data on growth in relation to age in Crustacea, as in other invertebrate animals, is scanty.

2. The growth curve of Crustacea is typically sigmoid, as in other animals. The arithmetic rate of growth rises to a maximum and then declines to zero at an asymptotically limiting maximum size.

3. In some Crustacea this limiting size is attained at an age beyond the mean expected life span. Growth is indeterminate in Crustacea only in this sense. They are not potentially immortal.

4. The geometric rate of growth (specific growth rate) declines monotonically with age from the outset, as in other animals (50), and the rate of decline itself declines with age.

5. The age dependent decline in growth rate in animals is to be regarded as a positive adaptive feature, not an unavoidable affliction.

6. Longevity is closely linked with growth rate.

7. The duration of the stadia (intervals between moults) typically increases with age.

8. In some Crustacea this increase ensures a constant geometric increment in size at each moult, and moulting would appear to be controlled by the extent of growth. These species obey Brooks' law.

9. In other Crustacea moulting is not thus controlled and the factor of increase at moulting (the Przibram factor) varies in almost every conceivable way.

10. The extent of regeneration of a Crustacean limb during the stadium following amputation is proportional to the length of the limb removed, so that regeneration rate, as a function of age, is approximately the integral of normal growth rate.

11. Specific regeneration rate decreases progressively with age, owing to the progressive increase in duration of stadia. The rate of decline is much less than that of normal growth rate. The rate of decline itself declines with age.

12. There have been few attempts to define Crustacean growth curves algebraically.

TABLE 1. RATE OF GROWTH IN BODY LENGTH AND ABDOMEN WIDTH AND REGENERATION RATES OF TWO THORACIC LIMBS AS A FUNCTION OF AGE, IN TWO INDIVIDUALS OF *Asellus aquaticus*. (ALL MEASUREMENTS IN MM. × 56)

No. of Stadium	Body Length	Przibram Factor	Abdomen Width	Przibram Factor	Total Length of Limb Regenerated in the Stadium		Duration of Stadium (Days)	Total Length Regenerated per Day		Specific Regeneration Rates	
					Thoracic Limb			Thoracic Limbs		Thoracic Limbs	
					8th	3rd		8th	3rd	8th	3rd
Individual No. 1 (Female)											
1	255		82.8		177.1	107.5	20	8.86	5.38	0.107	0.065
2	324	1.27	111.6	1.35	124.2	85.5	14	8.87	6.11	0.080	0.055
3	396	1.22	133.5	1.20	181.1	104.8	21	8.62	5.46	0.065	0.041
4	450	1.14	144.0	1.08	192.0	140.2	18	10.67	7.79	0.066	0.054
5	462	1.03	150.0	1.04	217.1	160.6	16	13.57	10.03	0.090	0.067
6	501	1.09	159.9	1.06	198.8	148.2	21	9.46	7.06	0.059	0.039
7	534	1.07	180.6	1.13	185.2	146.2	13	14.25	11.25	0.079	0.062
8	558	1.05	187.8	1.04	195.5	153.4	18	10.86	8.52	0.058	0.045
9	528	0.95	189.0	1.01	206.6	152.3	21	9.84	7.25	0.052	0.038
10	525	1.00	186.0	0.91	165.3	93.8	50	2.30	1.88	0.012	0.010
Individual No. 2 (Male)											
1	399		135.0		176.9	158.0	10	17.69	15.80	0.131	0.117
2	456	1.14	147.0	1.09	140.4	125.8	9	15.60	13.97	0.106	0.095
3	492	1.08	166.5	1.13	112.4	104.4	7	16.05	14.91	0.096	0.090
4	564	1.15	183.0	1.10	183.3	165.0	12	15.28	13.75	0.085	0.076
5	594	1.05	196.5	1.07	226.0	199.7	16	14.13	12.48	0.072	0.064
6	627	1.06	216.0	1.10	248.5	216.7	17	14.61	12.75	0.068	0.059
7	579	0.92	213.0	0.99	259.1	206.5	30	8.64	6.88	0.041	0.032
8	651	1.12	226.5	1.06	153.4	128.8	19	8.07	6.78	0.036	0.030
9	684	1.05	232.5	1.03	178.6	158.6	14	12.75	11.33	0.055	0.049
10	660	0.96	232.5	1.00	222.5	196.5	23	9.67	8.54	0.042	0.037

TABLE 2A. TWO EXAMPLES, IN TWO INDIVIDUALS OF *Asellus aquaticus*, OF THE INCREMENT IN VARIOUS LINEAR DIMENSIONS OF THE BODY FOLLOWING ONE ECDYSIS (MOULTING), SHOWING LOW AND HIGH PRZIBRAM FACTORS, RESPECTIVELY. ALSO GRADED VARIATION IN P.F. ALONG BODY. (MEASUREMENTS IN MM.)

Individual No. 1 (Female)				Individual No. 2 (Female)			
Measurement	Before Ecdysis	After Ecdysis	Przibram Factor	Measurement	Before Ecdysis	After Ecdysis	Przibram Factor
Total Body Length	7.90	6.65	0.86	Total Body Length	4.30	4.59	1.07
Abdomen Length	2.02	1.98	0.98	Abdomen Length	1.05	1.25	1.20
Abdomen Width	2.25	2.25	1.00	Abdomen Width	1.16	1.44	1.24
Width of Segments				Width of Segments			
8th Thoracic	2.13	2.08	0.98	8th Thoracic	1.13	1.40	1.25
7	2.15	2.32	1.09	7	1.17	1.48	1.27
6	2.25	2.25	1.00	6	1.14	1.43	1.25
5	2.42	2.47	1.03	5	1.15	1.44	1.25
4	2.38	2.44	1.04	4	1.12	1.42	1.27
3	2.18	2.19	1.01	3	1.10	1.32	1.20
2	2.05	2.00	0.98	2	1.00	1.21	1.21
Head	1.49	1.40	0.94	Head	0.86	0.98	1.15

TABLE 2B. INCREMENTS IN ABDOMEN WIDTH AND IN THE LENGTH OF THE SEVENTH THORACIC LIMB FOLLOWING AN ECDYSIS, IN A RANDOM SAMPLE OF INDIVIDUALS, TO SHOW VARIATION IN PRZIBRAM FACTOR. (MEASUREMENTS IN UNITS = MM. × 56.) *Asellus aquaticus.*

Males

No. of Individuals	Abdomen Width		Length of 7th Limb		Przibram Factor	
	Before	After	Before	After	Abdomen Width	Length 7th Limb
1	123	135	264.8	340.0	1.10	1.29
2	133	165	347.0	408.5	1.24	1.18
3	137	153	323.5	358.5	1.11	1.11
4	145	168	343.0	408.5	1.16	1.19
5	150	160	340.0	382.5	1.07	1.13
6	158	166	380.3	452.5	1.05	1.19
7	177	188	447.5	483.8	1.06	1.08

Females

No. of Individuals	Abdomen Width		Length of 7th Limb		Przibram Factor	
	Before	After	Before	After	Abdomen Width	Length 7th Limb
1	139	145	307.3	318.0	1.04	1.03
2	143	158	371.5	346.5	1.10	0.93
3	150	155	351.0	354.5	1.03	1.01
4	156	163	345.5	351.3	1.04	1.02
5	158	158	342.0	348.2	1.00	1.02
6	168	185	380.5	401.0	1.10	1.05
7	182	186	365.0	381.5	1.02	1.05

TABLE 3. MEAN GROWTH RATE IN ABDOMEN WIDTH AS A FUNCTION OF AGE (BODY SIZE) IN A LABORATORY POPULATION OF *Asellus aquaticus*. (MEASUREMENTS IN MM. × 56, FROM NEEDHAM, 1949)

Age (Size) Group (mm. Abdomen Width)	No. of Records	Mean Abdomen Width	Mean Increase in Abdomen Width at Ecdysis	Mean Duration of Preceeding Stadium (Days)	Specific Growth Rate (= Increment per Day, per Unit Abdomen Width)	Przibram Factor
40– 50	34	44.7	5.9	8.6	0.015	1.11
60– 70	54	64.0	8.4	9.8	0.014	1.13
80– 90	50	84.3	9.2	11.8	0.007	1.11
100–110	47	105.1	7.8	16.0	0.005	1.08
120–130	26	123.1	8.4	18.4	0.004	1.07
140–150	13	144.7	9.7	17.1	0.004	1.07
160–170	6	163.3	7.9	14.3	0.003	1.05
195–210	7	202.8	8.7	17.4	0.003	1.04

TABLE 4. MEAN REGENERATION RATE OF SEVENTH THORACIC LIMB OF *Asellus aquaticus*, AS A FUNCTION OF AGE, IN A LABORATORY POPULATION. (MEASUREMENTS IN MM. × 56, FROM NEEDHAM, 1949)

Age (Size) Group (mm. Abdomen Width)	No. of Records	Mean Abdomen Width	Mean Length of Limb Regenerated in Stadium Following Amputation	Mean Duration of Stadium	Specific Regeneration Rate (Length Regenerated per Day, per Unit of Abdomen Width)
45– 50	19	48.0	70.3	9.3	0.158
65– 70	25	66.8	84.9	10.6	0.120
85– 90	30	87.0	118.5	11.5	0.119
105–110	40	106.9	136.8	16.9	0.076
125–130	27	126.2	162.0	19.2	0.067
140–150	35	143.7	177.2	20.2	0.061
160–170	31	162.9	190.0	21.7	0.055
195–210	10	198.3	214.5	29.0	0.037

TABLE 5. GROWTH IN RELATION TO MOULTING AND TO AGE IN AN INDIVIDUAL *Carcinus maenas*, FROM THE BRITISH MUSEUM COLLECTION (NO. 1 OF NEEDHAM, 1941). MEASUREMENTS IN MM.

Date of Moulting	Duration of Previous Stadium	Total Time from First Observation (Days)	Carapace Length	Przibram Factor	Specific Growth Rate (Car. L.)	Carapace Width	Przibram Factor
3/ 8/1902							
8/ 8/1902	5	5					
2/ 9/1902	25	30	1.66			1.93	
29/ 9/1902	27	57		1.227			1.246
14/10/1902	15	72	2.50	1.227	0.0121	2.80	1.246
30/10/1902	16	88	3.15	1.260	0.0163	3.55	1.239
22/11/1902	23	111		1.294			1.300
24/12/1902	32	143	5.28	1.294	0.0125	6.00	1.300
2/ 2/1903	40	183	6.6	1.251	0.0063	7.80	1.330
13/ 4/1903	70	253	8.3	1.258	0.0037	10.00	1.282
25/ 5/1903	42	295	10.75	1.295	0.0069	13.10	1.310
17/ 7/1903	53	348	13.8	1.283	0.0054	17.15	1.301
13/ 8/1903	27	375	17.3	1.253	0.0093	21.60	1.267
3/11/1903	82	457	22.0	1.272	0.0033	27.70	1.282
4/ 3/1904	121	578	28.6	1.300	0.0025	36.10	1.303
12/ 7/1904	130	708	37.0	1.292	0.0022	47.30	1.302
20/10/1904	100	808	44.0	1.191	0.0019	56.20	1.196

Some of the earlier exuviae (cast skins) were lost or damaged. Where gaps occur the Przibram factor has been averaged over the two moults.

Some of the data presented in tables 3 and 4 are taken from the paper, Growth and Regeneration in *Asellus aquaticus* (L.), in Relation to Age, Sex, and Season, by A. E. Needham and are used by the permission of the Editor of the Journal of Experimental Zoology. The data in table 5 are reproduced by permission of the British Museum of Natural History.

References

1. Anderson, B. G.: The Number of Pre-Adult Instars, Growth, Relative-Growth, and Variation in *Daphnia magna*. *Biol. Bull. Wood's Hole, 63:* 81-98, 1932.
2. Anderson, B. G., Lumer, H. and Zupancic, L. J.: Growth and Variability in *Daphnia pulex*. *Biol. Bull. Wood's Hole, 73:* 444-463, 1937.
3. Anderson, B. G., and Hersh, A. H.: Differential Growth and Morphological Pattern in *Daphnia*. *Growth, 5:* 359-364, 1941.
4. Anderson, B. G., and Jenkins, J. C.: A Time Study of Events in the Life-Span of *Daphnia magna*. *Biol. Bull. Wood's Hole, 83:* 260-272, 1942.
5. Bassindale, R.: The Developmental Stages of Three English Barnacles, *Balanus balanoides* (Linn.), *Chthalamus stellatus* (Poli) and *Verruca stroemia* (O. F. Müller) *Proc. Zool. Soc. Lond.*, 57-74, 1936.
6. Bogorov, B. G.: Longevity and Ecological Characteristics of *Themisto abyssorum* in the Barents Sea. *C. R. Acad. Sci. U. S. S. R., 27:* 68-70, 1940.
7. Brody, S.: Growth and Senescence in *Growth* by W. J. Robbins, Yale University Press, New Haven, 1928.
8. Brody, S.: *Bioenergetics and Growth,* Reinhold Publishing Corp., New York, 1945:
9. Brook, G.: On the Rate of Development of the Common Shore-crab, *Carcinus maenas*. *Am. Mag. Nat. Hist., 14:* 202-207, 1884.
10. Brooks, W. K.: Report on the Scientific Results of the Voyage of H. M. S. Chalenger. *Zoology, 16:* (Part 45, Stomatopoda), 1886.
11. Calman, W. T.: *Brit. Mus. Nat. Hist., Guide to the Crustacea.* H. M. Stationery Office, London, 1927, p. 18.
12. Calvert, P. P.: Differential Rates of Growth Among Animals, with Special Reference to the Odonata. *Proc. Am. Philos. Soc., 68:* 227-274, 1929.
13. Campbell, M. H.: The Life-History and Post-Embryonic Development of the Copepods *Calanus tonsus* (Brady) and *Euchaeta japonica* (Marukawa), *J. Biol. Bd.*, Toronto, *1:* 1-65, 1934.
14. Collinge, W. E.: Duration of Life of Woodlice. *Nature,* London, *156:* 755, 1945.
15. Cowdry, E. V.: *Problems of Ageing.* Williams and Wilkins, Baltimore, 1942.
16. Dawes, B.: A Study of Normal and Regenerative Growth in the Pistol-Crab, *Alpheus dentipes* (Guèr.) *Arch. Entw. Mech. Org., 131:* 544-574, 1934.
17. Dyar, H. G.: The Number of Molts in *Lepidopterous* Larvae. *Psyche, 5:* 420-422, 1890.
18. Edlen, A.: Geburt, Geschlechtsreife und Vermehrung in Beziehung zum Wachstumsverlauf bei *Daphnia magna*. *Arch. Entw. Mech. Org., 137:* 804-807, 1938.
19. Ellis, M. M.: The Relation of the Amount of Tail Regenerated to the Amount Removed in Tadpoles of *Rana clamitans*. *J. Exper. Zool. 7:* 421-455, 1909.
20. Elmhirst, R.: *Interim Report (1930) of the Interdepartmental Committee on Crabs and Lobsters.* H. M. Stationery Office, London, 1930.
21. Fowler, G. H.: Biscayan Plankton, XII: The Ostracoda. *Tr. Linn. Soc. Lond. Zool., 10:* 219-336, 1909.
22. Frazer, F. C.: On the Development and Distribution of the Young Stages of Krill, *Euphausia superba*. *Discovery Rep. 14:* 1-192, 1936.
23. Grey, E. H., and Newcombe, C. L.: Studies of Moulting in *Callinectes sapidus* (Rathbun). *Growth, 2:* 285-296, 1938.
24. Gurney, R.: *British Fresh-water Copepods.* Ray Society, London, 1931.
25. Gurney, R.: The Development of Rhinocalanus. *Discovery Rep., 9:* 209-214, 1934.
26. Gurney, R.: *Larvae of Decapod Crustacea.* Ray Society, London, 1942.
27. Harrison, R. J.: On the Biology of the Caprellidae. Growth and Moulting in *Pseudocaprella phasma*. *J. Mar. Biol. Assn. U. K., 24:* 483-493, 1940.
28. Hecht, S.: Form and Growth in Fishes. *J. Morphol., 27:* 379-400, 1916.
29. Herrick, F. H.: The American Lobster. *Bull. U. S. Fish. Commission, 15:* 1-252, 1896.
30. Herrick, F. H.: Natural History of the American Lobster. *Bull. U. S. Bureau of Fisheries, 29:* 149-408, 1911.
31. Hiatt, R. W.: The Biology of the Lined Shore-crab, *Pachygrapsus crassipes*. *Pacific Sci., 2:* 135-213, 1948.
32. Howes, N. H.: Observations on the Biology and Post-Embryonic Development of *Idotea viridis* (Slabber) (Isopoda, Valvifera) from New-England Creek, South-East Essex. *J. Mar. Biol. Assn. U. K., 23:* 279-310, 1939.
33. Huxley, J. S.: Notes on Differential Growth. *Am. Nat., 65:* 289-315, 1931.
34. Huxley, J. S.: *Problems of Relative Growth.* Methuen and Co. Ltd., London, 1932.
35. Huxley, J. S., and Richards, O. W.: Studies in Heterogonic Growth (8). Changes in Proportions in the Abdomen of the Shore-crab, *Carcinus maenas*. *J. Mar. Biol. Assn. U. K., 17:* 1001-1016, 1931.
36. Huxley, T. H.: *The Crayfish.* C. Kegan Paul & Co., London, 1881.
37. Hyman, O. W.: The Development of Gelasimus after Hatching. *J. Morphol., 33:* 485-501, 1920.
38. Imms, A. D.: *General Textbook of Entomology.* Methuen and Co. Ltd., London, 1948.
39. Ingle, L.: Effects of Environmental Conditions on Longevity. *Science, 78:* 511-513, 1933.
40. Ingle, L., Wood, T. R., and Banta, A. M.: A Study of Longevity, Growth, Reproduction, and Heart-Rate in *Daphnia longispina* as Influenced

by Limitations in Quantity of Food. *J. Exper. Zool., 76:* 325-352, 1937.

41. Johnson, M. W.: The Life-History of the Copepod, *Tortanus discaudatus* (Thompson and Scott). *Biol. Bull. Wood's Hole, 67:* 182-200, 1934. The Developmental Stages of the Copepod, Epilabidocera amphitrites McMurrich. *67:* pp. 466-483. The Development of Labidocera. *68:* 397-421, 1935.
42. Keys, A. B.: The Weight-Length Relation in Fishes. *Proc. Nat. Acad. Sc., 14:* 922-925, 1928.
43. Korschelt, E.: *Lebensdauer, Altern und Tod.* G. Fischer, Jena, 1917.
44. Korschelt, E.: *Regeneration und Transplantation. I.* Gebrüder Borntraeger, Berlin, 1927.
45. Kükenthal, W.: *Handbuch der Zoologie,* III, 1. Crustacea. Walter de Guyter, Berlin and Leipzig, 1928.
46. Lebour, M. V.: Stages in the Life-History of *Calanus finmarchicus* (Gunnerus) Experimentally reared by Mr. L. R. Crawshay in the Plymouth Laboratory. *J. Mar. Biol. Assn. U. K., 11:* 1-17, 1916.
47. Lebour, M. V.: The Larval Stages of the Plymouth Brachyura. *Proc. Zool. Soc. Lond.* pp. 473-560, 1928.
48. Mackay, D. A.: Larval and Post-Larval Lobsters. *Am. Nat., 63:* 160-170, 1929.
49. Mackay, D. C. G., and Weymouth, F. W.: The Growth of the Pacific Edible Crab, *Cancer magister,* Dana. *J. Biol. Bd. Toronto, 1:* 191-212, 1935.
50. Medawar, P. B.: Size, Shape and Age, in *Essays on Growth and Form,* by W. E. LeGros Clarkand. P. B. Medawar, Oxford University Press, Oxford, 1945, pp. 157-187.
51. Medawar, P. B.: Old Age and Natural Death. *Modern Quarterly, 2:* 30-49, 1946.
52. Meek, A.: On the Crustacea. 2: Growth. *Rep. Dove Mar. Lab., 7:* 19-45, 1918.
53. Minot, C. S.: *The Problem of Age, Growth and Death.* G. P. Putnam's Sons, London, 1908.
54. Needham, A. E.: On Relative Growth in *Asellus aquaticus. Proc. Zool. Soc. Lond. A. 107:* 289-313, 1937.
55. Needham, A. E.: Relative Growth in the Individual. *Nature.* London, *148:* 52-53, 1941.
56. Needham, A. E.: Growth and Regeneration in *Asellus aquaticus* (L.) in Relation to Age, Sex and Season. *J. Exper. Zool.* (in press).
57. Newcombe, C. L., Sandoz, M. D., and Rogers-Talbert, R.: Differential Growth and Moulting Characteristics in the Blue-crab, *Callinectes sapidus,* Rathbun. *J. Exper. Zool., 110:* 113-152, 1949.
58. Nichols, A. G.: Developmental Stages of *Euchaeta norvegica. Proc. Roy. Soc. Edinburgh, 54:* 31-50, 1934.
59. Olmstead, J. M. D., and Baumberger, J. P.: Form and Growth of Grapsoid Crabs. *J. Morphol., 38:* 279-294, 1923.
60. Orton, J. H.: Experiments in the Sea on Rate of Growth of some Crustacea Decapoda. *J. Mar. Biol. Assn. U. K., 20:* 673-689, 1936.
61. Paulain, R.: Contribution a l'Étude quantitative de la Régénération chez les Arthropodes. *Proc. Zool. Soc. Lond. A., 108:* 297-383, 1938.
62. Pearson, J.: *Cancer.* Liverpool Marine Biological Committee, Memoir No. 16, Williams and Norgate, London, 1909.
63. Przibram, H.: Entwicklungsmechanik der Tiere. *Tabul. Biol. Berlin, 4:* 312-316, 1927.
64. Przibram, H.: *Connecting Laws in Animal Morphology.* University of London Press, London, 1931.
65. Przibram, H., and Megusar, F.: Wachstumsmessungen an Sphrodromantis bioculata, Burm. *Arch. Entw. Mech. Org., 34:* 680-741, 1912.
66. Rammer, W.: Über die Post-embryonale Entwicklung der Cladocere *Scapholeberis mucronata,* O. F. Müller. *Arch. Entw. Mech. Org., 113:* 287-311, 1928.
67. Rammer, W.: Über die Gültigkeit des Brooksschen Wachstumsgesetzes bei den Cladoceren. *Arch. Entw. Mech. Org., 121:* 111-127, 1930.
68. Reeve, E. C. R., and Huxley, J. S.: *Some Problems in the Study of Allometric Growth. Essays on Growth and Form.* W. E. LeGros Clark and P. B. Medawar, Oxford University Press, Oxford, 1945, pp. 121-156.
69. Schreiber, E.: Beiträge zur Kenntnis der Morphologie, Entwicklung und Lebensweise der Süsswasser-Ostracoden. *Zool. Jb. Abt. Anat., 43:* 485-538, 1922.
70. Shen, C. J.: An Investigation of the Post-larval Development of the Shore-crab, *Carcinus maenas,* with special Reference to the External Secondary Sexual Characters. *Proc. Zool. Soc. Lond.,* pp. 1-33, 1935.
71. Soubeiran, L.: Sur l'histoire naturelle et l'education des Écrivisses. C. R. *Acad. Sci. Paris, 60:* 1249-1250, 1865.
72. Sproston, N. G.: The Developmental Stages of *Lernaeocera branchialis. J. Mar. Biol. Assn. U. K., 25:* 441-466, 1942.
73. Terao, A.: Growth of the Lobster, *Homarus americanus. Proc. Soc. Exper. Biol., 25:* 353-355, 1928.
74. Thompson, D'A. W.: *On Growth and Form.* Cambridge University Press, Cambridge, 1942.
75. Williamson, H. C.: Contributions to the Life-History of the Edible Crab (*Cancer pagurus* Linn.) *Rep. Fish. Bd. Scot., 18:* 77-143, 1900.
76. Williamson, H. C.: On the Larval and Early Young Stages and Rate of Growth of the Shore-crab, *Carcinus maenas. Rep. Fish. Bd. Scot. 21:* 136-177, 1903.
77. Williamson, H. C.: Contributions to the Life-Histories of the Edible Crab (*Cancer pagurus*) and of Other Decapod Crustacea. *Rep. Fish. Bd. Scot., 22:* 100-140, 1904.

78. Zeleny, C.: Some Internal Factors Concerned with the Regeneration of the Chelae of the Gulf-weed Crab, *Portunus sayi*. *Papers Tortugas Lab., 2:* 103-138, 1908.

79. Ziegelmeyer, W.: Metamorphose und Wachstum der Cyclopiden. *Ztschr. f. wiss. Zool., 126:* 493-570, 1925.

80. Zuelzer, M.: Über den Einfluss der Regeneration auf die Wachstumsgeschwindigkeit von *Asellus aquaticus*, L. *Arch. Entw. Mech. Org., 25:* 361-397, 1908.

81. Zucker, L., and Zucker, T. F.: A Simple Time-Weight Relation Observed in Well Nourished Rats. *J. Gen. Physiol., 25:* 445-463, 1942.

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An Investigation of the Effects of Parenteral and Topical Administration of Steroids on the Elastic Properties of Senile Skin

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AN EXPERIMENT CONDUCTED ON 26 ELDERLY WOMEN DISCLOSED THAT TOPICAL APPLICATION OF ESTROGEN IMPROVED THE ELASTIC PROPERTIES OF THE SKIN ALTHOUGH PARENTERAL APPLICATION DID NOT. NEITHER LOCAL ADMINISTRATION NOR ANDROGEN INJECTION PRODUCED ANY CHANGE IN THE SKIN ELASTICITY OF THE 26 MEN IN THE INVESTIGATION.

THE fact that the local application of steroid substances may result in regenerative changes in senile skin has been shown by previous investigators. Max Goldzieher (1) studied the effects of inunction of the skin with estrogenic ointments of moderate potency and was able to demonstrate regeneration of the atrophic epidermis and also regenerative changes in the elastic fibrils of the cutis. Subseqent investigations by Joseph W. Goldzieher (2) have shown that both androgenic and estrogenic substances have the ability to regenerate atrophic epidermis if applied topically in sufficiently large doses and are equally efficacious in either sex. The method employed by these workers was that of histologic examination of skin obtained at biopsy.

Although this procedure demonstrates very clearly the changes produced it does not provide us with a means for quantitative comparison nor does it permit examination of the same areas of skin before and after treatment. Since the studies of Kirk and Kvorning (3) have shown that alteration in the elastic properties of senile skin are reflected in the curves obtained by the elastometer of Schade it was thought that this method might be applied to a study of the effects of administration of steroid substances.

METHOD

The apparatus for measuring the skin elasticity consists essentially of a lever and a recording drum. A shaft, terminating in a metal knob, is attached at a right-angle to one end of the lever. This shaft carries a small platform on which a weight may be placed. The other end of the lever terminates in a celluloid writing point which inscribes a curve on a rotating drum. The metal knob is placed in contact with the area of skin under investigation and the writing point placed against the drum. A base line is obtained and a 50 gm. weight is then placed on the platform. When two minutes have elapsed the weight is removed and the recording continued for a further three minute period. An analysis of the curve so obtained provides a means of estimating the deformation of the skin caused by application of the weight and the rebound of the tissues following its removal. Details for construction and exact manipulation of the apparatus may be obtained from the publication by Kirk and Kvorning (3).

EXPERIMENTAL

The studies were carried out on 26 elderly females and 26 elderly males. The patients were all inmates of the St. Louis City Infirmary and Infirmary Hospital and were all ambulatory. Care was taken in selecting the patients to exclude all individuals with edema or any condition likely to produce it since, as already shown by Schade (4) and Wiltrup (5), edema greatly alters the contour of the curves. The skin selected for investigation was an area over the medial aspect of the tibia 10 cm. proximal

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to the internal malleolus. Measurements were made prior to treatment by the method already described.

Thirteen females and 13 males were treated with parenteral administration of steroids. The females received 1 mg. of estradiol benzoate three times a week and the males received 25 mg. of testosterone propionate three times a week. The remaining 13 females and 13 males were treated with local application of the steroids. In these latter patients both legs were examined before commencement of treatment. Subsequently, the right leg was massaged with the steroid preparation which for the females was 1 mg. of estradiol benzoate in 1 ml. of oil and for the males 25 mg. of testosterone propionate in 1 ml. oil. An area of skin of 40 sq. cm. was massaged for ten minutes three times a week. The left leg was massaged with oil alone thus serving as a control for any effects which might result from the oil base of the steroid preparation. All patients were continued on treatment for two months and elasticity curves again obtained.

For simplicity of presentation composite curves have been constructed from the mean individual values. The significant portions of the curves are the initial indentation on application of the weight, the initial rebound on removal of the weight, and, the total rebound three minutes after removal of the weight. All these values are expressed as percentages of the total indentation.

Effects obtained in female patients.—Figure 1 shows the results of treatment with topical estrogenic substance. As will be seen from an examination of the curves there has been an increase in the three values already referred to as being of significance. This indicates an improvement in the elastic properties of the skin since the studies by Kirk and Kvorning (3) have shown clearly that in youthful individuals the response of the skin to application and removal of the weight is more rapid as is also the return of the skin to its original state. That the changes obtained in our patients are statistically significant can be seen from the t-tests given in the figure.

In figure 2 are shown the curves obtained from the legs of the patients treated with oil alone. In these individuals the immediate indentation is improved but the remainder of the curve is unchanged.

Parenteral administration of estrogen produced no change in the elastic properties of the skin as can be seen from figure 3.

Effects obtained in male patients.—Local application of testosterone to the skin of males produced no change in the elasticity curves as can be seen from figure 4. Massage with olive oil was similarly without effect (fig. 5).

Administration of parenteral testosterone resulted in a slight decrease in the total rebound. Since, however, the t-test is only 1.4 this finding is of doubtful statistical significance.

Summary

The effects of local and parenteral administration of steroids on the elastic properties of senile skin have been investigated by means of the elastometer of Schade.

Massage of the skin of females with estrogen in oil resulted in an improvement in the elastic properties of the skin as shown by a return towards a more youthful type of curve.

Parenteral estrogen produced no change.

The elasticity curves of the males were not improved either by parenteral or topical administration of androgens.

From the Division of Gerontology, Washington University School of Medicine and the St. Louis City Infirmary Hospital. Materials for this study were provided by Schering Corporation.

REFERENCES

1. Goldzieher, M. A.: The Effects of Estrogens on the Senile Skin. *J. Gerontol., 1:* 196-200, 1946.
2. Goldzieher, J. W.: The Direct Effect of Steroids on the Senile Human Skin. *J. Gerontol., 4:* 104-112, 1949.
3. Kirk, E., and S. A. Kvorning: Quantitative Measurements of the Elastic Properties of the Skin and Subcutaneous Tissue in Young and Old Individuals. *J. Gerontol., 4:* 273-283, 1949.
4. Schade, H.: *Die physikalische Chemie in der inneren Medizin.* T. Steinkopff, Dresden and Leipzig, 1921.
5. Wiltrup, G.: *Undersøgelser over Elasticitetsforholdene i Subcutis.* A. Busck, Copenhagen, 1924.

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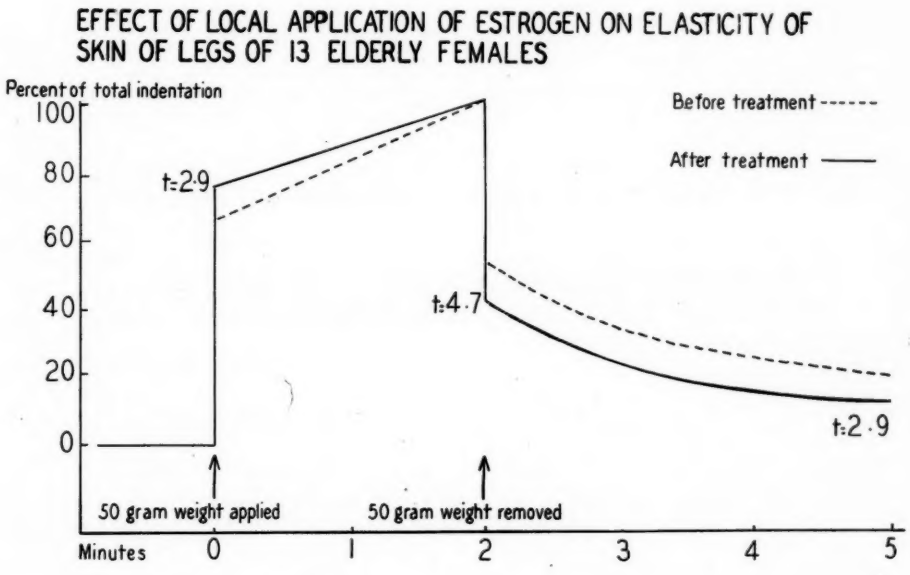

Fig. 1

FIG. 1. Mean elasticity curves before and after topical application of estrogens in females.

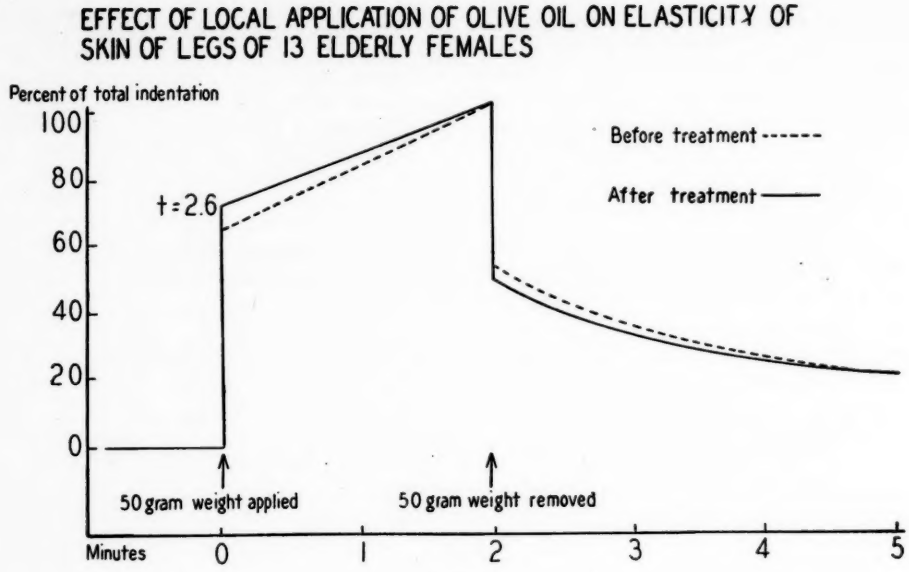

Fig. 2

FIG. 2. Mean elasticity curves before and after topical application of olive oil in females.

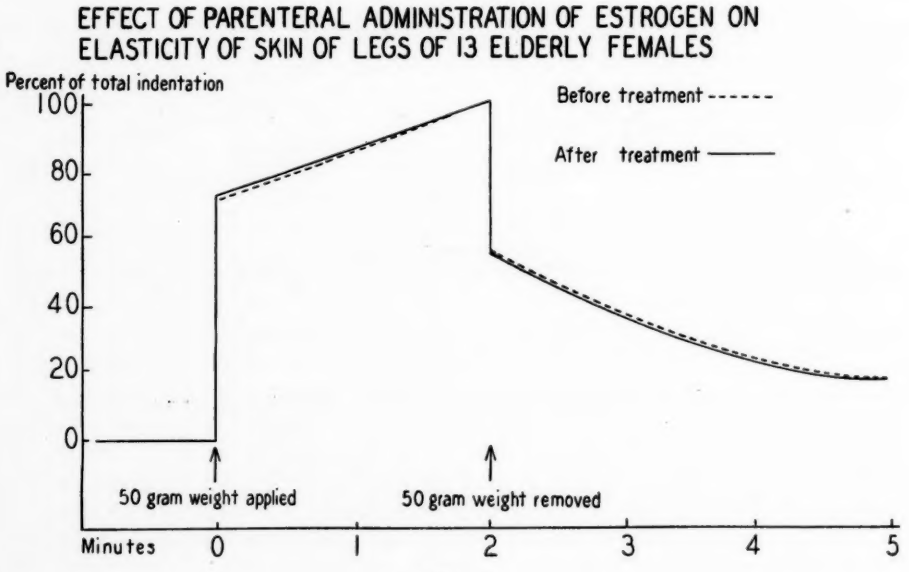

Fig. 3

FIG. 3. Mean elasticity curves before and after parenteral administration of estrogen in females.

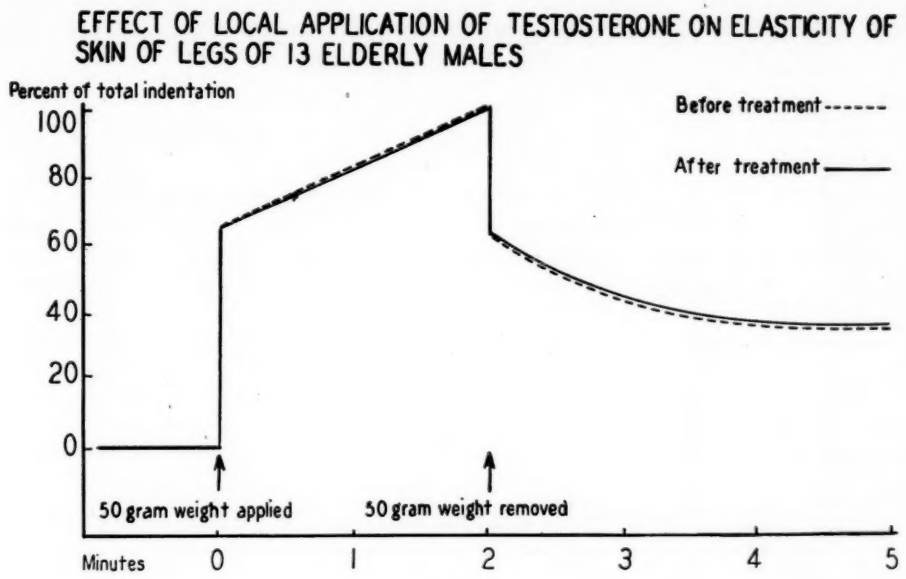

Fig. 4

FIG. 4. Mean elasticity curves before and after topical application of testosterone in males.

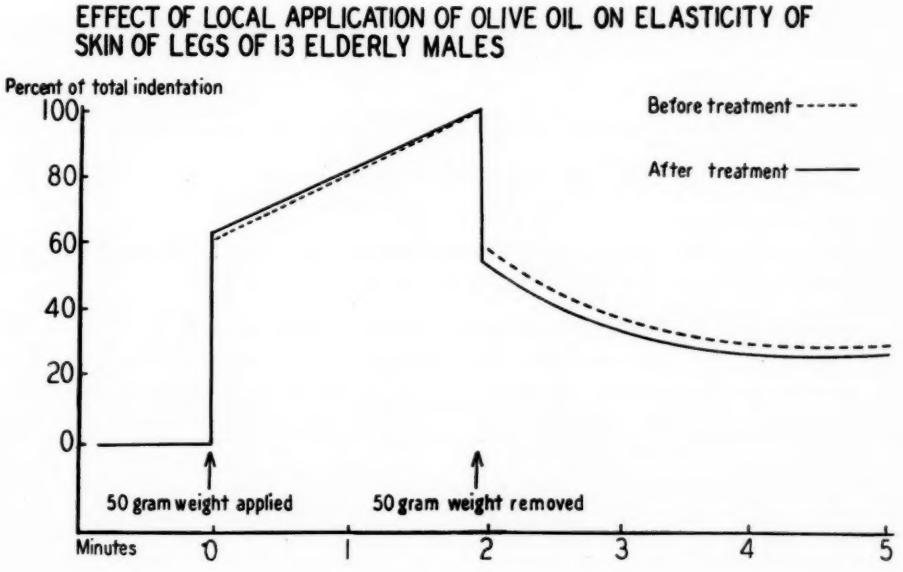

Fig. 5

FIG. 5. Mean elasticity curves before and after topical application of testosterone in males.

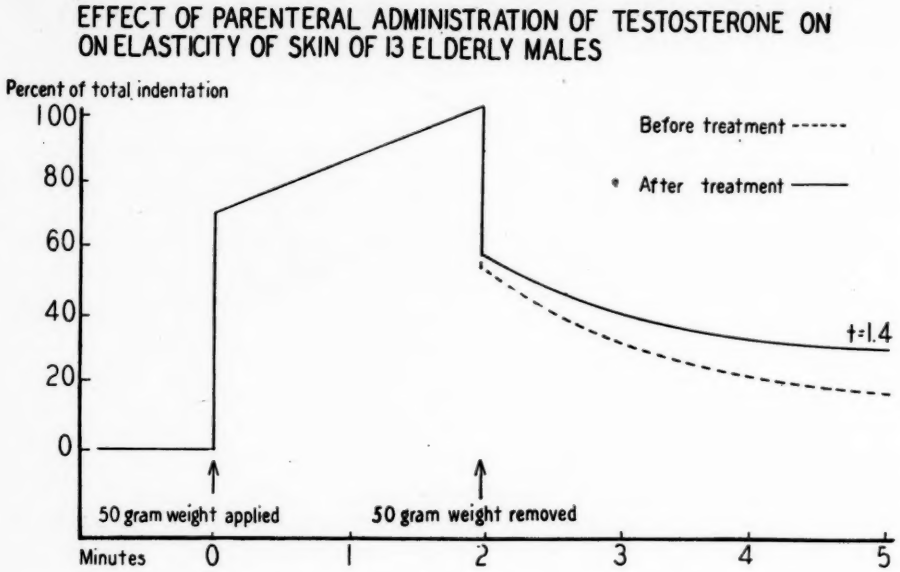

Fig. 6

FIG. 6. Mean elasticity curves before and after parenteral administration of testosterone in males.

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The Silica Content of the Aortic Wall in Various Age Groups

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ANALYSIS OF 35 HUMAN AORTAS DISCLOSED THAT THE SILICA CONTENT SHOWS NO CONSISTENT CHANGE WITH AGE.

ALTHOUGH extensive studies have been reported concerning the mineral content of the aortic wall in individuals of various ages, data on the silica content are very scarce. The only available publication concerning this subject sustained by determinations with a modern analytic technique is an investigation by Belt, Irwin, and King (1) in 1936, which includes analyses of 6 specimens of the thoracic aorta and 5 specimens of the iliac artery derived from individuals varying in age from 2 months to 74 years. The mean silica content of the aorta, expressed in per cent SiO_2 of the dry substance, was 0.022 (range 0.014 to 0.034) and of the iliac artery 0.035 (range 0.014 to 0.051). No other mineral constituents were included in the analysis, and the series of silica determinations was too small to give conclusive evidence regarding the effect of age on the silica concentration.

The present study was undertaken with the purpose of providing a fairly large number of tissue silica determinations for such evaluation.

METHODS

Samples of the upper portion of human thoracic aortas were obtained by autopsy, care being taken to avoid contamination with talc from the surgical gloves. After stripping off the adventitita, the artery was cut into pieces, which were then immersed in liquid air and subsequently ground in a metal grinder. Samples of the finely ground and thoroughly mixed tissue powder were used for determinations of dry matter, silica, total ash, calcium, total lipid, and cholesterol.

The silica analyses were performed by the modification of King's method recently described by Kvorning and Kirk (2). For total ash and calcium determinations the samples were ignited in a platinum crucible; after weighing, the residue was dissolved in dilute hydrochloric acid and the calcium content estimated by oxalate precipitation and permanganate titration. The lipids were extracted from the tissue powder by heating with alcohol-ether, using a reflux condenser, and were subsequently isolated by evaporation of the solvent and resolution in petroleum ether. The total lipid content was determined by weighing the residue of an aliquot of the petroleum ether extract in a weighing bottle, whereas the cholesterol amount was estimated spectrophotometrically on another aliquot of the extract by a modification of the Liebermann-Burchard reaction. All determinations were made in duplicate.

EXPERIMENTAL

The results of analyses of 35 human aortas are given in table 1, which besides the percentage of dry matter contains the values of the mineral and lipid constituents expressed in per cent of fresh aortic tissue. As will be seen from the table the silica content shows no consistent change with age nor any apparent relation to the other series of data. The silica values are of the same order of magnitude as those reported by Belt, Irwin, and King, with a mean SiO_2 content of 0.014 per cent. As would have been expected the ash, calcium, and cholesterol concentration of the aortic tissue show a marked increase with advancing years.

The coefficients of correlation between the total ash, calcium, total lipid, and cholesterol

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values on one hand and the silica content on the other hand are +0.15, +0.23, —0.10 and —0.13 respectively.

Summary

A study was made of the silica (SiO_2), total ash, calcium, total lipid, and cholesterol content of 35 human thoracic aortas. The silica con-

Table 1. The Content of Ash, Silica (SiO_2), Calcium, Total Lipid, and Cholesterol in 35 Human Aortas. (Values Expressed as Percentage of Fresh Tissue Weight)

No.	Sex	Age	Dry Substance	Ash	Silica (SiO_2)	Calcium	Total Lipid	Cholesterol
1	M	1/3	31.5	0.60	0.016			
2	F	1/2	29.8	0.40	0.019			
3	M	10	33.8	0.90	0.014	0.15		
4	M	10	30.9	1.00	0.018	0.09	2.9	0.68
5	F	22	23.4	0.52	0.011	0.19	3.0	0.29
6	M	23	20.2	0.53	0.011	0.11		
7	F	26	25.6	0.47	0.013	0.28	3.0	0.61
8	M	28	27.3	0.80	0.014	0.27	3.5	0.46
9	F	28	24.2	0.93	0.017	0.50	2.5	0.70
10	F	29	27.6	1.10	0.020	0.33	3.6	0.42
Mean			27.4	0.73	0.015	0.24	3.1	0.53
11	F	32	28.7	1.04	0.015	0.37	2.8	0.51
12	M	35	25.4	0.86	0.015	0.60	1.5	0.60
13	M	39	25.4	1.26	0.016	0.85	2.8	0.55
14	F	49	23.8	1.10	0.012	0.27	3.5	0.46
15	M	59	25.8	1.90	0.013	0.20	1.7	0.87
Mean			25.8	1.43	0.014	0.46	2.4	0.60
16	M	63	22.7	1.60	0.012	1.10	1.6	0.46
17	M	65	30.3	3.60	0.011	1.10	3.9	1.50
18	F	66	24.4	2.20	0.014	1.40	2.7	1.12
19	F	67	29.7	3.00	0.020	1.40	3.6	1.58
20	M	68	25.1	0.95	0.014	0.27	1.2	0.27
21	F	70	24.5	1.40	0.016	0.31	1.3	0.55
22	M	72	28.8	3.70	0.014	2.40	6.3	2.80
23	F	73	23.3	1.70	0.037	0.57	4.5	1.30
24	F	75	24.4	3.90	0.028	2.10	3.2	0.83
25	M	75	27.6	2.40	0.007	1.10	2.1	0.69
Mean			26.1	2.45	0.014	1.24	3.0	1.10
26	M	80	26.6	1.70	0.011	0.60	3.8	1.30
27	M	80	35.0	1.70	0.004	0.27	3.3	1.25
28	F	81	27.7	3.10	0.013	2.10	3.5	1.10
29	F	81	29.6	9.80	0.021	4.10	2.0	0.96
30	M	83	25.8	3.50	0.012	1.50	2.0	1.05
31	M	84	28.5	6.40	0.009	4.70	2.9	1.30
32	M	84	38.7	15.00	0.016	10.50	5.1	1.70
33	M	85	26.6	1.70	0.011	0.60	3.8	1.30
34	M	89	38.0	13.40	0.016	5.00	5.0	2.28
35	F	96	27.8	5.30	0.009	3.20	5.4	2.10
Mean			30.4	6.16	0.012	3.26	3.7	1.43

centration showed no definite change with age and averaged 0.014 per cent of the fresh tissue.

REFERENCES

1. Belt, T. H., Irwin, D., and King, E. J.: Silica and Dust Deposits in the Tissues of Persons Without Occupational Exposure to Silica Dusts. *Canad. M. A. J., 34:* 125-133, 1936.

2. Kvorning, S. A., and Kirk, E.: The Serum Silica Concentration at Various Ages. *J. Gerontol., 4:* 16-18, 1949.

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Progestins and Basal Body Temperature in Males

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ADMINISTRATION OF ANHYDROHYDROXYPROGESTERONE AND PROGESTERONE TO 15 MALE SUBJECTS CAUSED AN INCREASE IN BASAL BODY TEMPERATURE, ALTHOUGH THE FORMER WAS FOUND TO BE LESS EFFECTIVE.

ANHYDROHYDROXYPROGESTERONE in the form of linguets (compressed wafers designed for slow absorption through the buccal mucosa) and progesterone in peanut or sesame oil injected intramuscularly into the gluteal region were administered to 15 adult human males—selected from a related clinical investigation—who were in various phases of androgen therapy for different degrees of prostatism and/or the male climacteric. Relative effects of the progestin compounds on the earliest waking rectal temperature—or basal body temperature (B.B.T.)—were noted. Patients used Fahrenheit rectal thermometers inserted deeply for a definite five to seven minute time interval at approximately the same hour on awakening each morning.

Initial symptomatology of the subject group centered in such complaints as the following: relative loss of libido and potentia, decreased physical stamina, muscular atrophy, vaso-motor disturbances (hot flashes, hyper- and paresthesias, tinnitus), nervousness, emotional instability, melancholia, decrease or loss of memory, diminished ability to concentrate mentally, insomnia, prostatic hypertrophy and inflammation, nocturia, polyuria, urinary urgency, painful micturition, constipation, and pruritus ani.

Testosterone propionate intramuscularly and/or methyltestosterone perlingually (dissolved slowly beneath the tongue or in the buccal gutter between cheek and teeth) in daily doses of 5 to 80 mg. were capable, within several weeks, of ameliorating or abolishing the foregoing complaints. The average B.B.T. of males restored to well-being through the use of androgens was stabilized usually in the range of 98 F. ± 0.2 F. Following minimum doses necessary for the initial realization of this temperature range of saturation, the latter remained uninfluenced, as a rule, when massive doses of the same hormones were employed.

The progestins, which might be thought to act like the structurally related androgens, affected the B.B.T. in an entirely different fashion, creating characteristic thermal elevations (fig. 1). Single doses of progesterone, 10 to 50 mg., i.m., produced B.B.T. rises ranging from 0.1 F. to 2.0 F. Linguets of anhydrohydroxyprogesterone acted similarly; however, in different members of the test group, doses 10 to 30 times greater, milligram per milligram, were required to produce effects equal to those which resulted from a measured injection of progesterone.

Sensitivity to both compounds fluctuated markedly from person to person. In the same individual, graduated doses initiated thermal elevations which were usually proportional to the size of the dose. In the same subject, progesterone, i.m., was approximately 15 times more effective than linguets of anhydrohydroxyprogesterone in raising the B.B.T.; for example, 400 mg. of the latter were necessary to instigate a thermal elevation equal to that produced by 30 mg. of the former. Saturation doses gave average temperature levels of 98.4 F. to 99 F. Thermal elevations persisted, in most cases, four to seven days, declining progressively, dipping sharply, rising briefly, dipping again, and returning upward to approximate starting points.

Ten mg. of progesterone, i.m., produced a thermal rise which averaged 0.15 F. to 0.2 F. in about half of the test group and 0.62 F. in the other half. Individual variations were from 0.1 F. to 0.9 F. Patients in the second category, exhibiting a greater degree of thermal

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sensitivity to progesterone, seemed to possess little or practically no spermatogenic activity as judged from routine counts.

Nine doses of 20 mg. of progesterone in 6 members of the test group produced elevations in B.B.T. ranging from 0.2 F. to 2.0 F.

Eight injections of 30 mg. of progesterone in 5 individuals resulted in thermal shifts ranging from 0.4 F. to 1.0 F.

The injection of 40 mg. of progesterone produced rises of 1.4 F. and 1.7 F. in 2 respective individuals, while a dose of 50 mg. resulted in an elevation of only 0.5 F. in one individual who exhibited relatively moderate thermal sensitivity but responded intensely insofar as a recurrence of his prostatism was concerned.

In cases where a complete remission of symptoms had already been achieved through the use of testosterone propionate and/or methyltestosterone, the administration of progesterone or anhydrohydroxyprogesterone—in doses mentioned above—resulted in intense recrudescence of prostatic and/or climacteric symptomatology which was noticeable a few hours following injection. Patients complained about experiencing headaches, tension along the back of the neck, and bearing down and burning sensations with pressure in the rectum, groins, and penis. To gauge frequency of micturition, constant twenty-four hour urine records were maintained by the patient. Anabolic weight gains achieved through the use of androgens were lost in subjects who later received progesterone and/or anhydrohydroxyprogesterone. Some individuals complained of nasal stuffiness and head colds shortly after treatment with the progestins.

Discussion

The present study was intended, originally, to help clarify the relative worth of transbuccosal or sublingual versus peripheral steroid therapy. Aside from the end clinical picture considered in relationship to necessary maintenance doses in such syndromes as male hypogonadism (2), no other investigational yardstick was readily available to measure results objectively. It was reasoned that the known temperature raising property of progesterone in woman, demonstrated by Zuck (4) and Israel and Schneller (3), and its chemical structure closely related to the androgens should make it the drug of choice in this investigation. The possibility of intrinsic endocrine factors which might serve to confuse experimental results was present in woman; hence, human males were selected as subjects.

Progesterone and anhydrohydroxyprogesterone possess differences in their chemical formulae, but both have common clinical usage in the human female. Employment of linguet therapy in preference to steroids administered via the parenteral route has been advocated on the basis of relative economy and facility of administration. Formerly, the notion was popular that progesterone was inert or of little practical value when taken orally. Bickers (1) has recently published data which would indicate that the contrary of this contention is true. This present research was conducted before the newer facts were available; therefore, the study

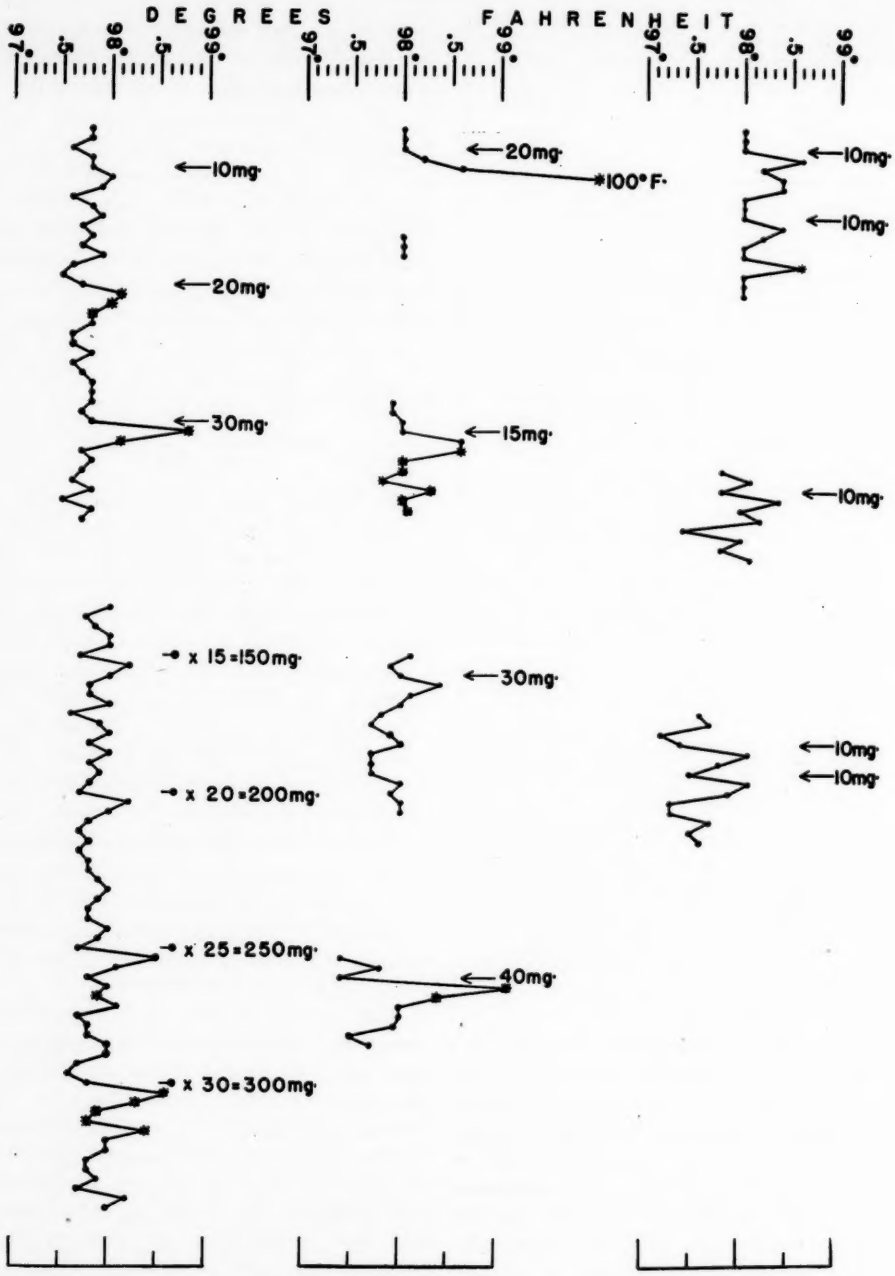

Fig. 1. Progestins and basal body temperatures in adult human males.

DOTS = Daily Rectal Basal Body Temperatures

↓ = Injection of Progesterone

↓• = Compressed 10 mg. Wafers (Linguets) of Anhydrohydroxyprogesterone

* = Nasal Congestion, Head Cold, Flu, etc.

failed to include progesterone for sublingual or oral administration.

It should not be inferred from this study that all forms of steroid linguet therapy are inferior to preparations administered via the intramuscular route. These data are concerned, chiefly, with the comparison of a common property of two distinct steroid compounds, namely, the thermal shift effect. It is hazardous to generalize with respect to the qualities of any given steroid unit(s) from the known characteristics of any structurally related compound(s). Current knowledge of the properties of certain sex steroids and structurally related carcinogens will attest to the wisdom or merit of judging each compound by pharmacodynamic qualities peculiar to itself.

Summary

Data are presented which indicate:

The temperature raising effect of progesterone, factually established phenomenon in female physiology, was manifest when members of a group of human adult males received varying intramuscular doses (10 to 50 mg.) of this hormone.

Anhydrohydroxyprogesterone administered sublingually elicited analogous thermal shifts, but, in the same individual, was approximately 15 times less effective than i.m. progesterone, milligram for milligram in elevating the basal body temperature.

Both compounds reproduced symptomatology characteristic of the male climacteric and/or various prostatic or genito-urinary complaints.

Certain individuals exhibited a peculiar hypersensitivity to these steroids, reacting with nasal stuffiness, head colds, nuchal tension, and other symptoms, such as lower abdominal discomfort and cramps, resembling menstrual molimina in women.

The data reported in this paper are extracted from a more comprehensive study which was presented, in abbreviated form, at the Thirtieth Annual Meeting of the Association for the Study of Internal Secretions, Chicago, Illinois, June 18 and 19, 1948.

The author is indebted to Ciba Pharmaceutical Products, Inc., for the androgens (Perandren in peanut and sesame oil, and Metandren 5 and 10 mg. Linguets) and progestins (Lutocylin in peanut and sesame oil, and Lutocylol 10 mg. Linguets) furnished for this study.

Ayerst, McKenna and Harrison, Ltd., Rouses Point, N. Y., supplied sheets and instructions especially prepared for plotting basal body temperature curves.

References

1. Bickers, W.: Progesterone: A Comparison of Intramuscular, Oral and Sublingual Routes of Administration. *J. Clin. Endocrinol., 9:* 736-742, 1949.
2. Finkler, R. S.: Male Hypogonadism Treated by Sublingual Methyltestosterone. *J. Clin. Endocrinol., 7:* 293-302, 1947.
3. Israel, S. L., and Schneller, O.: Thermogenic Properties of Progesterone. (Paper presented at the Fourth Annual Conference of the American Society for the Study of Sterility, Chicago, Illinois, June 21 and 22, 1948).
4. Zuck, T. T.: The Relation of Basal Body Temperature to Fertility and Sterility in Women. *Am. J. Obst. & Gynec., 36:* 998-1005, 1938.

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The Sheltering of the Aged

A Thorough Analysis of the Living Arrangements of 1900 Old Age Assistance Recipients

JOHN J. GRIFFIN

AN ANALYSIS COVERING 1900 PERSONS ON THE OLD AGE ASSISTANCE ROLLS OF SOMERVILLE, MASSACHUSETTE, FEBRUARY, 1949, SHOWS THE TYPE OF LIVING ARRANGEMENTS CHOSEN BY RECIPIENTS, MARITAL STATUS, AMOUNT OF RENT PAID, AND WITH WHOM THEY LIVED. THE CONCLUSION IS DRAWN THAT THERE IS NO PARTICULAR TYPE OF LIVING ARRANGEMENT SUITABLE TO ALL ELDERLY PEOPLE BUT THAT CONDITIONS GIVING THE AGED COMPANIONSHIP AND FREEDOM OF CHOICE ARE PREFERABLE.

IN providing satisfactorily for the aged the importance of adequate shelter is being increasingly recognized. The intimate relationship between housing and health has long been known, and the meaning of domestic environment to both the physical and mental well-being of the elderly is now receiving study.

The gravity of the widespread housing shortage, among other factors, has contributed to the development of the new emphasis and served to call attention to the fact that the increase in the longevity of our people is reflected in their longer use of houses. So subtle, however, has the effect of the increment in the number of the aged been on the availability of facilities that this datum is frequently overlooked. More dramatic has been the impact of the current crisis in the placement of the aged. Supplying proper shelter for the aged, especially the needy aged, constitutes one of our most urgent social problems.

The vexing question of sheltering the quantitatively impassive number of aged in our midst has elicited a great deal of abstract theorizing as well as some drastic solutions. Some harassed public welfare administrators nurse the notion of building vast, modernly equipped structures designed to domicile hundreds or even thousands of the old, although whether or not such accommodations will meet with the approval of our seniors does not seem to be given much consideration. Many of the experiments in this area, denuded of their advertised aura of grandeur, actually amount to the ancient almshouse in disguise. The fascinating facade crumbles when searching inquiry is made as to the sufficiency of staffing personnel, especially in respect to medical and nursing care (2).

The "pan-institutionalizers," often pressed by a number of chronically ill patients, frequently proceed on the illusory basis that the preponderance of aged are terminally ill cases. While it is true that many of the incorporated homes for the aged are becoming custodial centers for residual cases, it should not be overlooked that less than 2 per cent of the 10,700,000 aged in the United States are in such abodes. In thinking of the housing of our aged we have over-accented institutionalization (1).

There are, of course, a variety of other plans being projected. The experience of Sweden and Denmark in building special dwellings for the aged has proved suggestive. England's famous "plus granny flats" in London and its urban and rural cottages for oldsters are gaining attention. The proportionate place of residential apartment houses and hotels for the aged remains to be determined. Apparently a high degree of success has marked the Tompkins Square Apartments in New York and also a similar enterprise operated as an extension of the Hebrew Home for Aged and Infirm in the same city.

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In federal housing projects thus far the erection of units for lone residents has been prohibited. The states and municipalities have in general followed the national pattern save for such well-known exceptions as the Fort Green Houses in New York City where 50 of the 300 units were fashioned for unattached aged. There is, however, appreciable agitation for large-scale expansion in this field. But it would seem advisable before advancing any general schemes founded on unsupported assumptions to study further the actualities of the present situation. Much more evidence than has been thus far accumulated scientifically is needed before the extent to which any one of the great variety of home substitutes is necessary can be decided.

One fundamental fact too frequently forgotten is that the housing habits of the aged are neither of uniform character nor are they necessarily fixed. The aged of our urban civilization are surprisingly mobile and many of them demonstrate considerable flexibility in shifting their manner and locale of living. Aged persons like all other humans manifest marked individualism. Hence in housing as in other areas their habits, tastes, and desires are infinitely varied and diverse. The measure of each person's health, marital and parental status, education, racial customs, income level, emotional needs, life-long standards, neighborhood loyalties, circumstantial pressures—all these and a host of other imponderables condition choices. Thus we are warranted in being somewhat skeptical about the final utility of idealistic housing legislation for the aged in the abstract. Categoric thinking which ignores the elusive human equation may conduce to costly blunders. The subsidizing of public housing programs for the aged should be undertaken only after there has been sufficient study of the known housing practices of the aged.

In order to shed some light on the problem at hand an analysis of a complete public assistance caseload in respect to actual housing and selected elements intimately cognate was undertaken. The field of inquiry covered the entire Old Age Assistance caseload of the City of Somerville, Massachusetts, in the month of February, 1949, comprising in all 1900 persons.

The Somerville Bureau of Old Age Assistance pays recipients semi-monthly in advance by checks mailed to their residences. In the month of February, 1949, the 1939 clients received $119,569.39 in direct relief, or an average per capita allowance of $61.67, one of the highest per case grants in the nation. Of the $119,569.39 some $7,858.53 represented reimbursement to 573 persons for needed hospitalization, physicians' fees, medicines, and prosthetic devices. Clients in accordance with the statutory law of the Commonwealth have freedom of choice in the selection of personal physicians whose claims are honored at the regular professional fee scale with few exceptions. Bills for all medicines which are prescribed by physicians are accepted, and clients have freedom of choice in selecting pharmacists. Vendors are not paid directly (except in the event of the client's commitment or demise) but allowances for such expenses are paid directly to the clients by special checks mailed monthly. Despite the fact that the city is highly congested, having 105,888 people within its 4.2 square miles, during the year 1948 only 1364 residents of Somerville died. Of this number, 890 (approximately 65.25 per cent) were over 60 years of age.

Housing

In accordance with the prevailing budgetary plan, housing may be conveniently considered under five distinct headings: apartments, single rooms, board and room, ownership, and nursing home care. The most significant segment of the 1900 persons studied lived in apartments or tenements. The balance of the statistics are shown in table 1.

Apartments.—The basic maximum allowed by the State Standards of Assistance for a heated apartment is $32.00 monthly plus $4.75 monthly for light and gas, or a total of $36.75. An over-all 8.3 per cent cost-of-living adjustment increases this figure to $39.80.

The basic maximum allowed for unheated apartments is $25.00. In order to make the figures comparable it is necessary to add the allowances for fuel under such circumstances. An item of $13.60 per month is placed in the budget if coal is used for heating or $14.65 for oil. This brings the basic maximum in the former case up to $38.60 and in the latter instance to $39.65. Hence with the 8.3 per cent adjustment, the maximum figures are $41.80 and $42.94 respectively. It is obvious therefore that the client living in an unheated apartment receives slightly more for the aggregate need of shelter and fuel than does his fellow in a heated apartment.

The breakdown on figures of those living in apartments is shown in table 1.

Insofar as marital status is concerned (table 1A) those who lived in heated apartments were classified as follows: 46.7 per cent were widows, 29.5 per cent were married recipients, 8.1 per cent were spinsters, 5.8 per cent were widowers and an equal number were men with nonrecipient spouses, 2.5 per cent were separated women, and 0.8 per cent represented a woman with a nonrecipient husband while another 0.8 per cent represented a bachelor. Thus 64.7 per cent of this group were without spouses.

Of the 659 persons who resided in unheated quarters (table 1A), 43.5 per cent were widows, 27.9 per cent were married recipients, 9.1 per cent were widowers, 9 per cent were husbands with nonrecipient wives, 4.6 per cent were spinsters, 2.6 per cent were women with nonrecipient husbands, 1.2 per cent were bachelors, 0.75 per cent were separated men, a like number were divorced women, 0.45 per cent deserted women, and 0.15 per cent were women estranged from their husbands. Hence 60.5 per cent of this classification were spouseless.

Table 1. Type of Living Arrangements Chosen by Recipients. Number, Sex, and Percentage of Caseload Selecting Various Types of Arrangements Are Indicated

Type of Living Arrangement	Male	Female	Total	Percentage of Grand Caseload
Apartments	257	524	781	41.1
Heated	33	89	122	6.4
Unheated	224	435	659	34.7
Single Rooms	102	163	265	14.0
Heated with Kitchen Privileges	1	32	33	1.7
Heated with Cooking Facilities	8	41	49	2.6
Heated Meals Out	88	84	172	9.1
Unheated Meals Out	5	6	11	0.6
Board and Room	191	400	591	31.0
Owned Property	71	86	157	8.3
Nursing Home	28	78	106	5.6
Totals	649	1,251	1,900	100.0

TABLE 1A. TYPE OF LIVING ARRANGEMENT IN RELATION TO MARITAL STATUS

Marital Status	Heated Apartment	Unheated Apartment	Single Room	Board and Room	Residence Owned	Nursing Home
Widows	57	287	106	285	51	58
Widowers	7	60	50	103	13	18
Married Recipients (*i. e.*, Spouse Also Recipient)	36	184	10	50	48	1
Men with Nonrecipient Wives	7	59		12	33	2
Women with Nonrecipient Husbands	1	17	2	6	5	3
Spinsters	10	30	45	69	6	15
Bachelors	1	8	27	37	1	4
Divorced Men			2	5		3
Divorced Women		5	2	2		
Separated Men		5	14	8		1
Separated Women	3	1	2	12		1
Deserted Women		3	3	1		
Deserted Men			2	1		
Totals	122	659	265	591	157	106

Governmentally fixed rental ceilings were of real import to recipients. Of the 122 persons who had heated apartments 76.3 per cent paid between $26.00 and $50.00 monthly for rental. Complete figures are shown in table 2.

TABLE 2. AMOUNT OF RENT PAID BY RECIPIENTS LIVING IN HEATED APARTMENTS. NUMBER AND PERCENTAGE OF PERSONS IN EACH RENTAL CATEGORY ARE INDICATED

Amount of Rent	Number of Persons	Percentage of Group
Less than $10.00 per Month	2	1.6
$16.00 to $20.00 per Month	7	5.7
$21.00 to $25.00 per Month	9	7.4
$26.00 to $30.00 per Month	11	9.0
$31.00 to $35.00 per Month	38	31.1
$36.00 to $40.00 per Month	21	17.3
$41.00 to $45.00 per Month	9	7.4
$46.00 to $50.00 per Month	14	11.5
$51.00 to $55.00 per Month	2	1.6
$56.00 to $60.00 per Month	3	2.5
$61.00 to $65.00 per Month	3	2.5
$66.00 to $70.00 per Month	2	1.6
$71.00 to $75.00 per Month	1	0.8
Totals	122	100.0

The size of the heated apartments ranged from 2 to 7 rooms with 2 and 3 room suites preponderant. Complete tabulation is listed in table 3.

TABLE 3. NUMBER OF ROOMS IN HEATED APARTMENTS BY NUMBER OF PERSONS AND PERCENTAGE OF GROUP

Number of Rooms	Number of Persons	Percentage of Group
2	46	35.0
3	37	30.0
4	19	15.6
5	15	12.3
6	3	2.5
7	2	1.6
Totals	122	100.0

Less than a third (28.7 per cent) of these 122 recipients had persons living with them, and only 22.1 per cent of the total subjects had children living with them. Table 3A indicates the marital status of these children.

The results of fixed rent ceilings are especially well exemplified in the case of those who lived in unheated tenements. Of the 659 accommodated in this fashion, 67.5 per cent paid only between $16.00 and $30.00 monthly. The detailed analysis is shown in table 4.

Because of the evidence revealed in the course of this study the local bureau succeeded in obtaining the following upward revision in rental ceilings, effective July 1, 1949. All of these basic figures are increased by the 8.3 per cent cost of living adjustment: from $25.00 to $27.50 monthly for unheated apartments or

TABLE 3A. COMPANIONSHIP OF 122 RECIPIENTS WHO RENTED HEATED APARTMENTS. MARITAL STATUS OF RECIPIENTS AND OF THE CHILDREN LIVING WITH THEM IS INDICATED

Marital Status of Recipients	Alone	Single Children	Widowed Children	Divorced Deserted Separated Children	Brothers and Sisters	Other Relatives	Non-relatives
(36) Married Recipients (18) Couples	33	1 S 2 D					
(7) Widowers	3	2 S 2 D					
(57) Widows	29	12 D 3 S	4 D	1 DS	2 SB 1 MSi	1 WM 1 SN	3
(10) Spinsters	10						
(1) Bachelor	1						
(7) Men with Nonrecipient Wives	7						
(3) Separated Women	3						
(1) Woman with Nonrecipient Husband	1						
(122) Totals	87	22	4	1	3	2	3

S = son; D = daughter; DS = divorced son; SB = single brother; MSi = married sister; WM = widowed mother; SN = single niece.

carrying charges; from $32.00 to $34.00 monthly for heated apartments; from $5.00 to $6.50 weekly for heated rooms with kitchen privileges or cooking facilities; from $5.00 to $6.00 weekly for heated rooms without kitchen privileges or cooking facilities.

TABLE 4. AMOUNT OF MONTHLY RENTS PAID FOR UNHEATED APARTMENTS BY NUMBER OF PERSONS AND PERCENTAGE IN EACH RENTAL CATEGORY

Rental Costs	Number of Recipients	Percentage of Group
Up to $10.00	10	1.6
$11.00 to $15.00	60	9.1
$16.00 to $20.00	130	19.7
$21.00 to $25.00	180	27.3
$26.00 to $30.00	135	20.5
$31.00 to $35.00	80	12.3
$36.00 to $40.00	40	5.8
$41.00 to $45.00	15	2.3
$46.00 to $50.00	5	0.8
$51.00 to $55.00	2	0.3
$56.00 to $60.00	2	0.3
Totals	659	100.0

The size of the unheated apartments ranged from 2 to 8 rooms, although most of the apartments were of moderate size. In fact, 556 of the 659 persons in this group (84.3 per cent) lived in 3 to 5 room tenements. The actual count is shown in table 5.

Only about a third of the 659 persons having unheated apartments enjoyed some sort of domestic companionship. It is important to

TABLE 5. NUMBER OF ROOMS IN UNHEATED APARTMENTS. RELATED NUMBER OF RECIPIENTS AND PERCENTAGE OF GROUP REPRESENTED ARE INDICATED

Number of Rooms	Number of Recipients	Percentage of Group
2	21	3.2
3	88	13.3
4	217	33.0
5	251	38.0
6	65	9.9
7	10	1.5
8	7	1.1
Totals	659	100.0

remember that the others lived with them and not vice versa since in the latter instance, if the occupants were children, the clients would not be considered household heads but rather would be placed for budgetary purposes on a board and room basis. Some 40 per cent had their apartments shared by others; in fact, 35.5 per cent had children residing with them. Of the 234 who had children with them, 42.7 per cent had single daughters, 32 per cent had single sons, 7.7 per cent had married daughters, 8.1 per cent had widowed children, and 7.8 per cent had children whose marriages were broken. In many cases, of course, persons had both single sons and single daughters with them, but in order to avoid duplication in the count only one kind of progeny was enumerated.

Although no psychologic study is being attempted here the significance in terms of physical and mental health of the great number of those who dwell in solitude immediately presents itself. The need for freedom from social isolation, the demand for community planning in the way of recreational facilities (3), genuine occupational therapy, and sympathetic geriatric casework services is apparent.

Written beneath the surface of the numerals too are all the questions which revolve about the experience of parents whose children sacrifice their all to stay with them. There is the vicious circle of those who are preparing for themselves a lonesome old age because they will not leave their parents alone. There is the broad area of adjustment resulting from the return to the parental home of children bereft or estranged from their marital partners. What sort of relationships are built up by these living arrangements? Is the effect on the aged parents altogether wholesome? What of the preparation of these children for their old age? What does the balance sheet of gains and losses show in the last analysis?

Despite all the atomizing effects on humanity of contemporary civilization, the enormous power of the bond of blood is manifested by the relatively high ratio of those who do share a home together. The desire to maintain a home is especially evident in those who live in these apartments. Past habits as well as the measure of health and availability of companions are reflected in the choice of heated or unheated apartments. At every juncture individual characteristics are asserted as well as the craving for social communication and the sense of security which flows from family solidarity.

Rooms.—The State Standards of Assistance set two different maximums for room rentals. The maximum allowed for a room with kitchen privileges is $4.50 weekly or $19.50 monthly. The maximum allowed for a room alone is $4.00 weekly or $17.35 monthly. Given the 8.3 per cent over-all cost of living adjustment, these figures are augmented to $21.12 and $18.79 monthly, respectively. No distinction is made between heated and unheated rooms, nor is any special consideration given when there are cooking facilities available in a room.

By virtue of a special agreement reached with the State Welfare Department about two years ago the Somerville Bureau pays up to a maximum of $5.00 weekly or $21.65 monthly to recipient roomers. With the 8.3 per cent adjustment this latter figure is increased to $23.45. An additional allowance of $0.50 weekly or $2.15 monthly is given when special charges are made for light or gas. These figures of course are per individual person. Thus, a married couple having a room with kitchen privileges could pay up to $36.85 monthly, that is, $17.35 is allowed to one and $19.50 to the other, the $2.15 extra in the latter case being considered coverage for the costs of using the kitchen.

Not more than one or two persons in the entire caseload live under such circumstances. Incongruously enough, however, the basic maximum allowable to a couple for a room with kitchen privileges exceeds the basic maximum allowable to a person or couple occupying a heated apartment. In the latter instance the ceiling figure is $32.00 monthly plus $4.75 for light and gas.

Of a total of 265 persons, 172 (65 per cent of the group) lived in heated rooms and ate

their meals in restaurants (table 1). Only 11 individuals (4 per cent of this group) rented unheated rooms. These persons also ate in restaurants. Another 49 (18.5 per cent of the group) had heated rooms with cooking facilities, while a fourth segment comprising 33 persons (12.5 per cent of the group) resided in heated rooms and had kitchen privileges. Thus of the 265 in this category, 31 per cent cooked their own food while 69 per cent obtained their meals in public places. Only those persons who cannot cook, are unskilled in preparing their own meals, or who do not have the requisite cooking equipment available are budgeted at the relatively high rates given to those who eat in restaurants.

Persons who eat in restaurants are allowed $42.00 monthly if they eat all meals out. If they eat two meals out, they may be given the same allowance on the theory that they need compensatory nutrition for the usual third meal. Men who have one meal in restaurants are given $31.10 monthly for this need while women are given $30.45. These figures are notably higher than the allowances granted for food to those who maintain their own apartments or rooms and eat at home. In the latter case the amounts allowed vary with sex and

TABLE 5A. COMPANIONSHIP OF 659 RECIPIENTS WHO RENTED UNHEATED APARTMENTS. MARITAL STATUS OF BOTH RECIPIENTS AND CHILDREN LIVING WITH THEM IS INDICATED

Marital Status of Recipients	Living Alone	With Spouse Only	Single Children	Widowed Children	Divorced Separated Deserted Children	Married Children	Brothers and Sisters	Other Relatives
(287) Widows	145		57 D 39 S	10 D 1 S	2 DS 4 SS 3 DD 5 SepD	5 D 1 S	2 SiB 1 WB 3 SiS 5 WS	4
(60) Widowers	41		12 D 5 S			1 D		1
(184) Married Recipients (92) Couples		126	22 D 12 S	6 D	2 DS	6 D 2 S		8
(17) Married Women with Nonrecipient Husbands		10	2 D 3 S			1 D		1
(59) Married Men with Nonrecipient Wives		27	15 S 6 D	1 D	2 SepD	5 D 1 S		2
(30) Spinsters	30							
(8) Bachelors	8							
(5) Separated Men	4		1 S					
(5) Divorced Women	3			1 D				1
(3) Deserted Women	2		1 D					
(1) Separated Woman	1							
(659) Totals	234	163	175	19		22	11	17

S = son; D = daughter; DS = divorced son; DD = divorced daughter; SS = step son; SepD = separated daughter; SiB = single brother; WB = widowed brother; SiS = single sister; WS = widowed sister.

the number of persons sharing the table. Men living alone are given $27.00 and women $25.05. Where two are together the respective figures are $22.50 and $20.90, and when three share the household $19.50 is the figure for males and $18.35 that for females. All of these basic amounts are adjusted upwards by 8.3 per cent. Moreover, an additional 35 per cent increase is given to the malnourished, the convalescent, and those suffering from tuberculosis. Diabetics, arthritis victims, and others requiring special diets are given cost allowances.

The traditional aptitude of women in cooking and the customary reluctance of men to cultivate the culinary art are evidenced in the varying proportions of those who prepared their own meals. Of the 102 men only 8.8 per cent cooked for themselves, while the other 91.2 per cent patronized restaurants. On the other hand, of the 163 women, 44.8 per cent did their own cooking, and 55.2 per cent ate out.

The roomers insofar as marital status is concerned were distributed as shown in table 6.

TABLE 6. MARITAL STATUS OF 265 ROOMERS

Marital Status	Number of Roomers	Percentage of Group
Widows	106	40.0
Widowers	50	19.0
Spinsters	45	17.0
Bachelors	27	10.1
Separated Men	14	5.2
Married with Recipient Spouses	10	3.75
Deserted Women	3	1.2
Separated Women	2	0.75
Married with Nonrecipient Spouses	2	0.75
Divorced Men	2	0.75
Divorced Women	2	0.75
Deserted Men	2	0.75
Totals	265	100.00

In order to keep the figures for this category comparable with those for other groups, the rents were computed on a monthly basis, although actually invariably paid on a weekly schedule. Only 11 of the 265 rooms rented by recipients were unheated. Of these 63.6 per cent cost between $11.00 and $15.00 monthly, 18.2 per cent had rentals ranging from $16.00 to $20.00 monthly, and a similar number had charges exceeding maximum budgetary grants, being between $31.00 and $35.00 monthly. About 28 per cent of the entire group paid rentals in excess of the $23.45 maximum budgetary allowance. The balance of the figures are shown in table 7.

TABLE 7. AMOUNT OF MONTHLY RENT PAID BY RECIPIENTS HAVING HEATED ROOMS

Monthly Rent	Number of Recipients	Percentage of Group
Less than $10.00	21	8.3
$11.00 to $15.00	13	5.1
$16.00 to $20.00	59	23.2
$21.00 to $25.00	91	35.8
$26.00 to $30.00	31	12.2
$31.00 to $35.00	31	12.2
$36.00 to $40.00	5	2.0
$41.00 to $45.00	1	0.4
$46.00 to $50.00	2	0.8
Totals	254	100.0

That the aged do not relish living alone is well illustrated by the comparative fewness of those living in single rooms. The manifold diversity of arrangements even in such a limited setting argues the need for individual styling in housing for the aged. The marked tendency to flee cramped quarters is also evidenced by the preponderance of those who eat outside. What living in a room and eating regularly in cheap (perforce) restaurants does to the physical and mental health of the aged may perhaps be surmised. But here too there is room for research. We do know that some of those who live alone and prepare their own food suffer from anemia and malnutrition. The emotional factor of lack of table companionship serves to aggravate and complicate the picture of economic poverty.

Board and Room.—Almost a third of the total caseload recipients were budgeted on the basis of board and room arrangements. The exact figures are 400 women and 191 men, or

a total of 591, representing 31 per cent of all who were thus accommodated.

It would not be precisely correct to say that all the recipients in question chose this manner of arrangement, although almost all accepted it. The State Standards of Assistance call for the automatic budgeting of recipients who live with married children on a board and room basis. By married children are meant children whose spouses actually live with them. Hence divorced, separated, or deserted children are not considered as married in budgeting processes.

Recipients who live with married children whose income is above the subsistence level (as determined by the mandatory state budget figures) are allowed up to $7.00 weekly or $30.35 monthly for found. If the married child's income is less than 10 per cent above the subsistence level the recipient's allowance for this expense may be increased up to $9.00 weekly or $39.00 monthly. While the board and room arrangement is actually almost invariably the case when recipients live with married children, there are a few clients who insist that they purchase and cook their food separately from the household. However, except in those cases where a physician has prescribed special diets, these clients are blanketed in the board and room group.

Recipients who live with relatives other than children are allowed up to $9.00 weekly for this item and those who live with nonrelatives are allowed up to $12.00 weekly or $52.00 monthly. Only persons receiving some degree of care receive higher allowances. All the basic figures are augmented by the 8.3 per cent adjustment. The marital distribution in this classification is shown in table 8. Actual payments are listed in table 9.

It is remarkable that in this day of family dissolution some 83.8 per cent of the 591 persons boarding and rooming lived with relatives. Details are shown in table 10. Of the 347 who lived with married children, 250 (over 72 per cent) were with married daughters and 75 (22 per cent) with married sons; 19 lived with daughters widowed or estranged, and 3 had single daughters sharing accommodations with them.

TABLE 8. MARITAL STATUS OF RECIPIENTS HAVING BOARD AND ROOM ARRANGEMENTS

Marital Status	Number of Recipients	Percentage of Group
Widows	285	48.2
Widowers	103	17.5
Spinsters	69	11.7
Bachelors	37	6.3
Married Recipients	50	8.3
Married Men with Non-recipient Spouses	12	2.1
Separated Women	12	2.1
Separated Men	8	1.3
Married Women with Non-recipient Spouses	6	1.0
Divorced Women	5	0.8
Divorced Men	2	0.3
Deserted Men	1	0.2
Deserted Women	1	0.2
Totals	591	100.0

Despite the figures promulgated by the home economists and nutritionists who formulate the basis for the State Standards, it seems reasonable to challenge the sufficiency of the rates allowable for board and room in view of the current high cost of living. If public assistance is regarded as a redistribution of the wealth of the nation rather than as a mere expedient, the wisdom of the economics of such arrangements seems questionable. That these situa-

TABLE 9. AMOUNT OF WEEKLY PAYMENTS FOR BOARD AND ROOM BY RECIPIENTS HAVING SUCH ARRANGEMENTS

Weekly Amount	Number of Recipients	Percentage of Group
$7.00	359	60.7
$9.00	138	23.3
$12.00	42	7.1
$10.00	15	2.5
$8.00	11	1.9
$15.00	11	1.9
$11.00	4	0.7
$18.00	2	0.35
$16.00	2	0.35
Unusual Amounts (see text)	7	1.2
Totals	591	100.00

tions are charged with emotional dynamism has already been indicated. The reversal of children's early dependency on parents to the dependency of the parental aged on adult children is demonstrated in these circumstances.

TABLE 10. RELATIONSHIP OF PERSONS WITH WHOM RECIPIENTS HAVING BOARD AND ROOM ARRANGEMENTS LIVED

Relationship	Number of Recipients	Percentage of Group
Children	347	58.7
Brothers and Sisters	76	12.9
Nieces and Nephews	49	8.2
Other Relatives	24	4.0
Nonrelatives	95	16.2
Totals	591	100.0

Ownership.—The Massachusetts Old Age Assistance Law (Chapter 118 A G.Ls.) is generous in its provisions for the ownership of real estate. The statute very explicitly states that the mere ownership of property may not in itself constitute a barrier. There are, however certain qualifying provisions.

Since need is the primary requisite for eligibility, if the income from the realty is sufficient to support the proprietor he is not eligible. Also if the applicant's equity in his property exceeds $3000.00 he must give a mortgage bond to the city for the amount of his equity exceeding $3000.00. The amount of equity is computed by taking the average assessed valuation for the five years preceding the date of application and deducting therefrom the average amount of any outstanding mortgages. Since the first $3000.00 of equity in property of each person is wholly exempt, a married couple having joint ownership of a house have a $6000.00 exemption. If while a recipient of assistance the owner decides to sell his property or if he dies, the city, if holding a mortgage bond, may recover an amount equal to the amount of assistance given, but not to an amount greater than the amount of the mortgage bond.

The realty owned must be the residence of the proprietor. A recipient may not retain property in which he does not live merely as an investment, even though the income therefrom is inadequate to provide decent support. Nor may a recipient retain ownership in two pieces of property, such as two houses, in one of which he resides, unless one be a summer house uninhabitable all year round, or except the second house is inextricably allied to the first as if on one lot of land indivisible for sale purposes. A recipient owning property in which he resides who at some time becomes so physically or mentally disabled that he cannot safely continue his residence is not, however, required to place the property on sale immediately. Insofar as budgetary standards are concerned, net carrying charges up to the ceiling for unheated apartments are allowed, that is, $27.27 monthly.

Of the 1900 persons under study, 8.3 per cent (157) owned property in which they resided. The number included 24 married couples receiving assistance, 33 husbands whose wives were not recipients, and 5 wives of nonrecipient husbands. Almost a third (51) of the proprietors were widows, while slightly over a twelfth (33) were widowers. The remaining 7 were comprised of 6 single women and a single man.

The advantage of owning property, despite a high tax rate ($49.90 per $1000.00), is demonstrated by the impressively low net carrying charges. In fact, of the 157 individuals concerned, 19 (12.1 per cent) enjoyed a net profit on their property. An additional 109 (69.4 per cent) had carrying charges of $25.00 monthly or less. The tabulation is shown in table 11.

More than two-thirds of the possessors of their own homes had their apartments shared by others. Of the 24 married couples, however, 17 (approximately 71 per cent) lived by themselves; the other 7 had the company of children. Of the 33 men owning houses whose spouses were not recipients, 17 (just over half) had no one but their wives, while 15 also had children with them. Of the 51 home-owning widows, 34 (exactly two-thirds) were alone, 11 (over 19 per cent) were companioned by

TABLE 11. MONTHLY CARRYING CHARGES ON RESIDENTIAL PROPERTY OWNED BY RECIPIENTS

Monthly Carrying Charges	Number of Recipients	Percentage of Group
Less than $10.00 profit	13	8.3
$11.00–$15.00 profit	5	3.2
$16.00–$20.00 profit	1	0.6
Less than $10.00 net costs	38	24.2
$11.00–$15.00 net costs	22	14.0
$16.00–$20.00 net costs	31	19.7
$21.00–$25.00 net costs	18	11.5
$26.00–$30.00 net costs	7	4.5
$31.00–$35.00 net costs	7	4.5
$36.00–$40.00 net costs	9	5.7
$41.00–$45.00 net costs	2	1.3
$46.00–$50.00 net costs	2	1.3
$51.00–$55.00 net costs	1	0.6
$81.00–$85.00 net costs	1	0.6
Totals	157	100.0

children, while the remainder shared their domicile with other close relatives. Of the 13 widowers, only 5 (38.5 per cent) enjoyed the company of children, while the rest remained alone. Only one bachelor owned real estate, but there were 6 maiden ladies living alone in their own homes. In this enumeration, neither the divorced, the separated, nor the deserted were possessors of homes.

Nursing Home Caseload.—The last group consisted of 106 inhabitants of commercial nursing homes. In all these cases the necessity of such arrangements was certified by a physician. In this category there were 78 women and 28 men, that is, 73.6 and 26.4 per cent respectively. Of the 28 men 64.3 per cent were widowers, while of the 78 women 58 (about 74.4 per cent) were widows.

Shelter is not considered as a separate item in the budget of nursing home cases. Basic grants in these instances are for found and care; therefore, it will suffice to indicate the amount of these basic grants in order to illustrate the point at issue.

The State Standards of Assistance call for the classification of nursing home patients into three categories, namely, the bed-ridden, the semi-invalid, and the ambulant. The corresponding budgetary rates are $21.00, $18.00, and $15.00 weekly. Since a month is assumed to comprise four and a third weeks, the monthly rates therefore are: $91.00, $78.00, and $65.00. The 8.3 per cent adjustment is not allowed in nursing home cases.

In actual practice, no nursing home beds are available locally at less than $18.00 weekly, and very few at less than $25.00. Consequently, it is frequently necessary to exceed the stipulated State reimbursable rates. Usually, satisfactory clearance of these cases with the State Department is accomplished.

Of the 106 persons so domiciled, 70.7 per cent received basic grants of $25.00 weekly or $108.35 monthly, 6.6 per cent received $18.00 weekly or $78.00 monthly, 4.7 per cent received $20.00 weekly or $86.70 monthly, 7.5 per cent received $21.00 weekly or $91.00 monthly, 5.7 per cent received $23.00 weekly or $99.70 monthly, 1 received $30.00 weekly or $130.00 monthly, and 3.8 per cent received $49.00 weekly or $212.35 monthly. These latter 4 persons, while carried in the nursing home caseload, are actually terminal cases hospitalized in an institution for the chronically ill. It is notable that of those living in nursing homes less than one-fourth were receiving less than $100.00 montly for found and care.

TABLE 12. BASIC WEEKLY COSTS PAID FOR NURSING HOME PATIENTS

Weekly Charges	Number of Recipients	Percentage of Group
$25.00 Weekly	75	70.7
$21.00 Weekly	8	7.5
$18.00 Weekly	7	6.6
$23.00 Weekly	6	5.7
$20.00 Weekly	5	4.7
$49.00 Weekly	4	3.8
$30.00 Weekly	1	1.0
Totals	106	100.0

The proprietary nursing homes here as elsewhere exact the highest rates the traffic will bear and hence it is not unusual for relatives, friends, church charities, or other voluntary agencies to supplement. Since many of the nursing homes are getting as high as $60.00

weekly for private accommodations, it is not surprising to discover that the basic grants to 20 (almost 19 per cent) of the 106 patients were being supplemented by outside sources.

The actual breakdown showed that 1 person receiving $18.00 weekly from the O.A.A. Bureau was paying $30.00, 1 receiving $18.00 was paying $35.00, 1 receiving $21.00 was paying $25.00, 1 receiving $23.00 was paying $25.00, 2 receiving $25.00 were paying $28.00, 6 receiving $25.00 were paying $30.00, 6 receiving $25.00 were paying $35.00, and 2 receiving $25.00 were paying $40.00. In other words 16 persons, or more than a fifth of the 75 receiving the maximum $25.00 weekly grant, were compelled to tap outside sources in order to finance suitable appointments.

It should perhaps be stressed that in addition to the basic grants in all these cases additional allowances are given for clothing, personal needs, insurance, and prescribed medicines. Premiums on life insurance up to $2.15 monthly are budgetable. The allowances for clothing and personal needs combined are: $6.30 monthly for ambulant and semi-invalid males; $7.80 monthly for ambulant and semi-invalid females; $4.35 for bedridden males; and $3.65 for bedfast females.

Discussion

Since the evidence at hand is admittedly limited, prudence dictates caution in its interpretation. Certain conclusions, however, seem well warranted. It is fairly obvious, for example, that no particular fashion in housing is peculiar to our senior citizens.

Perhaps the preeminent fact emerging from the recorded data is that the aged do prefer social living. Comparatively few accept the possibility of living alone in a single room. Of those who do live in such solitary surroundings, the majority find it preferable to eat in public restaurants. The fundamental need and desire for communication would seem to be illustrated too by the fact that the unmarried, the widowed, and the estranged exhibit to an impressive extent a preference for multiroom apartments. Quarters allowing for companionship in some way were by far the most popular with the group studied.

Most of the clients are receiving enough assistance to cover the costs of shelter. The stability of rentals during the period under review probably gave an unusual degree of adequacy to the grants for this expense in spite of the inflationary spiral in other living costs.

It should be noted that the Massachusetts Old Age Assistance statute provides very liberal exemptions for children, most of whom are excused from legal liability. Thus, each single child living at home has a basic exemption of $1500.00 yearly plus the amount paid in federal and state income taxes. Moreover, any amount paid by such a child for found, under $10.00 weekly, is not considered an asset in calculating the parental budget. Single children outside the home have a basic exemption of $1750.00 per year, a married child without children irrespective of whether or not his spouse is dependent has an exemption of $2750.00 yearly, and an added exemption of $500.00 for each child. In all cases the basic exemption is increased by the amount of federal and state income taxes.

If children's income exceeds the exempted amounts plus taxes they are obliged to contribute one-third of the residue to their needy parent or parents; however, very few children are found legally liable. Nevertheless an appreciable number either live with their aged parents or the parents live with them and hence they bear a proportion of shelter costs.

The impact of incapacitating illness is reflected in the nursing home caseload. The fact that less than 6 per cent of the grand caseload was using commercial nursing homes may perhaps reasonably suggest a dearth of such facilities. Although good accommodations of this kind are nearly always at a premium, there was no one held on a waiting list during the month of study. Good nursing homes in surrounding cities and towns are used whenever necessary.

The *relative* paucity of persons in proprietary homes serves to demonstrate that such domiciliary resources represents a last desperate resort (4). Placement in these quasi-institutional havens more often than not means removal from cherished old neighborhoods, acceptance of systematic routine, and frequently the depressive experience of mingling with the terminally sick. The deep-seated love for home is respected by social workers who not infrequently are successful in deferring institutionalization by commanding the services of visiting nurses, hiring housekeepers, or inducing relatives to furnish solicitous care temporarily. Those planning housing projects should never forget that to the aged especially is applicable the ancient axiom: there is no place like home.

It is virtually impossible to unravel the complexity of factors physical, psychologic, social, economic, and others which in the individual instance conspire to motivate the selection of one or the other of the variety of possible or available accommodations. There is nothing in the data presented to validate generalizations based on sex, marital status, parental relations, or assistance income, although all of these elements as well as others did undoubtedly contribute to condition decisions in specific cases. Nor is it easy to determine to what extent real freedom of choice prevailed. Economic exigencies, social urgencies, psychologic compulsions, pressures born of physical disabilities, and similar factors, as well as objective ecologic influences and the housing shortage itself, unquestionably played restrictive roles that should not be entirely overlooked. Nor should the weight of ethnic background, familiar traditions, and cultural attitudes be discounted. On the ultimate analysis, there are numerous hidden source-springs of motivation far beyond the tabulator's ken.

Since the purpose of the present investigation is confined to recording the actual data, it suffices simply to call attention to the existence and importance of the more remote realities. It most certainly would be imprudent to project any extensive plans for housing the aged without studying carefully and with perspective all the influential factors of consequence to their well-being and comfort.

Certain broad sociologic implications may of course be safely inferred. The essential incompetency of public assistance to furnish by itself an adequate economic backbone for the aged seems obvious. The life of the aged is too often apt to be almost wholly synthetic. Assistance is a substitute for earned income, artificial group living is a substitute for family life, lodging houses, boarding homes, nursing hostels, institutions are substitutes for home. The inherent dignity of integral human personality can scarcely escape suffering some obscuration. The geriatrician knows best the effect of the synthetics in the realm of physical and mental health. The study assuredly highlights the relevant importance of socio-economic background to the geriatrician planning for his patient.

There seems to be some evidence that Assistance Standards are often developed a priori without sufficient knowledge of actual living conditions. The need for a full scale review of the proportionate place and of the realism of public assistance seems indicated. The need for research in the fundamental area of family functioning and relationships is likewise suggested. In brief, the urgency of developing economic and social prophylaxis concomitantly with preventive geriatrics is manifest (5).

Summary

An analysis of the living arrangements of 1900 recipients of Old Age Assistance has been made. The marital status, shelter costs and domestic environment have been shown. The facts seems to indicate the difficulty of mass planning for the highly individualistic aged whose personal choice of arrangements appears paramount. Despite widespread family dissolution the study reveals a high proportion of aged living with close relatives. The preponderance of cases obviously make manifest the desire for social living. Generally speaking, assistance grants appear relatively adequate but there is a detrimental tendency to budgetary

fixation and areas of unmet need were unveiled. The need for further analytic study is stressed.

References

1. Abrams, C.: Housing the Elderly Here and Abroad, in the report, *Birthdays Don't Count*, Legislative Document No. 61, New York State Legislature, Albany, 1948.
2. Griffin, J. J.: New Enthusiasms and Ancient Abuses. *Public Welfare, 5:* no. 3, pp. 68-70, 1947.
3. Griffin, J. J.: Recreation for the Aged. *Public Welfare, 2:* no. 12, pp. 288-289-298, 1944.
4. Griffin, J. J.: Sheltered Care for the Aged. *Survey Midmonthly, 81:* pp. 323-326, 1945.
5. Stieglitz, E. J.: *A Future of Preventive Medicine.* The Commonwealth Fund, New York, 1945.

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Studies in the Psychology of Senility - A Survey

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MR. GRANICK'S SURVEY OF THE LITERATURE ON THE PSYCHOLOGY OF OLD AGE REVEALS THAT WHILE SOME ABILITIES DECREASE WITH AGE OLDER PEOPLE CAN ACHIEVE AS WELL AS YOUNGER SUBJECTS WHEN SPEED IS NOT A FACTOR. ALTHOUGH THERE IS A DECLINE IN PERSONALITY FUNCTIONING, ON THE AVERAGE THE OLDER PERSON IS EMOTIONALLY STABLE AND THE HEALTHY PERSONALITY ADAPTABLE TO NEW SITUATIONS.

ALTHOUGH still considered a relatively new field for study, psychologists have been interested in the personality characteristics and general functioning of senile individuals for a long time. Kuhlen (47) pointed out that as far back as 1835 Quetelet gathered data on the physical, intellectual, and emotional characteristics of old people with a view towards deriving a clear and broad perspective of the total life process. Galton (79) also took an active interest in old age by making a number of investigations which enabled him to describe, with a fair degree of precision, the relationship between senility and some aspects of perceptual and intellectual functioning.

This early start, however, was apparently not followed through with the vigor and enthusiasm that characterized the study of childhood, adolescence, and early maturity. Thus the field of senility is still one of the frontiers of psychology. Even today, despite the recognition given to the large increase in the percentage of old people in our population with the resultant vast growth of pressure for psychiatric, psychologic, and social services for this age group (18, 51, 61) and the organization of a division of Maturity and Old Age in the American Psychological Association, as well as other research oriented agencies, relatively little work has been published on the psychology of old age.

Thus, the Psychological Abstracts, for example, list only 67 articles of interest to psychologists pertaining to maturity and old age appearing in a large assortment of periodicals during 1948. Few of these articles, moreover, describe controlled scientific studies. On the other hand, hundreds of items are cited under the headings of childhood and adolescence, a high proportion representing research projects.

Over the course of the past few decades, however, a body of research findings has accumulated which throws some light on the nature of the psychologic functioning of old people. Extensive reviews of the literature were made by Miles (69) in 1935 and in the German language by Hofstätter in 1938 (39). In both instances normal aging processes were related to the psychology of adulthood and maturity. Other reviews have limited themselves to certain aspects of the psychology of adulthood and old age, such as intelligence (5, 58, 59) and personality adjustments (47). The present survey attempts to bring together a variety of types of studies which either directly or indirectly make possible generalizations about the mental and personality functioning of individuals beyond the age of 40 who are relatively healthy emotionally. Investigations reported in the issues of the Psychological Abstracts between 1927 and June 1949 are included. Not considered, however, are studies related to the sensory processes.

INTELLECTUAL AND LEARNING ABILITIES

Intelligence Test Performance.—In reviewing the earliest studies on the performance of older adults on standard intelligence scales, Miles and Miles (64) mention that the findings point to a slight decline in people's general abilities by the time they reach their fiftieth year, and that by year 70 the decline is quite

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large. The authors questioned these results since many of the studies were on atypical populations and the reliability and validity of the tests used as measures of adult intelligence had not been definitely determined. Later studies, however, generally substantiated the hypothesis that old age brings with it an over-all decrease in mental abilities (5), but no uniformity to the decrease has been found.

The first well controlled and extensive investigation of general intellectual functioning in late maturity was by Jones and Conrad (40) who administered the Army Alpha to 1191 native-born Americans of various ages in 19 New England villages. Among the findings was a gradual decline in performance after age 21, but by 55 the recession was quite large. This was in fairly close agreement with the earlier reports and conclusions of Yerkes (100), Grace (31), Foster and Taylor (22), Beeson (2), Mursell (71), and Weiss (94).

In further extending the age range investigated for general intellectual performance Miles and Miles (64) tested individually 823 subjects, aged 5 to 95 years, on the Otis Self-Administering Test of Mental Abilities, Higher Examination, Form A, allowing a 15 minute time limit instead of the usual 20 or 30 minute period. Their results showed the older subjects as being relatively less capable than the younger individuals. A calculated loss of one month of Mental Age was found for the 40 year old group in relation to the achievement of the younger groups. By age 50 the loss in Mental Age was discovered to be 11 months, which was the same for the sixth and seventh decades; and by the ninth decade of life the loss was 28 months.

Along similar lines, Wechsler (92) found, in standardizing the Wechsler Bellevue Adolescent and Adult Intelligence Scale, that overall scores tended to decrease progressively with increase in age, and that the decline after 40 years was quite steep. Considerable intellectual deterioration with advancement in age was thus suggested.

In examining the relative performance of older and younger groups on the sub-tests of the various intelligence scales it was discovered that mental decline with age was not uniform. On the vocabulary and information items of the Army Alpha the subjects of advanced age were found by Jones and Conrad (40) to do as well as the other groups. Performance on numerical completion, common sense, and analogies problems, however, showed significant decline with age. A less extensive study by Willoughby (95) on 611 subjects, aged 10 to 60 years, had previously resulted in somewhat similar findings. Age curves for vocabulary and general information tests showed performance to be on a stable level throughout the adult years. Marked decrease in height of achievement with increase in age, on the other hand, was noted for opposites, series completion, and analogies tests.

Wechsler (92) also noted a differential difficulty of the test items of his intelligence scale for senescents. Thus the subjects above 40 years of age found the vocabulary, information, comprehension, and object assembly subtests much easier than the digit-symbol substitution, block design, and picture arrangement items. Madonick and Solomon (66) administered the Wechsler Bellevue Intelligence Scale to 50 individuals past age 60 and observed

substantially the same order of difficulty of the test items for the subjects. Similar results with the Wechsler Bellevue were obtained by Rabin (77) on 54 nonpsychotic seniles, aged 50 to 84, and by Chesrow, Wosika, and Reinitz (9) on 20 subjects, aged 64 to 83, except that in these instances the object assembly test was found to be among the difficult items for older adults. Apparently, therefore, the evidence from mental test performance points to the full retention of some intellectual abilities in old age while others decline to a significant extent.

Memory.—Consideration of the specific aspects of mental decline with age has been the subject of many investigations. The most ambitious and extensive study was the Stanford Later Maturity Research, directed by Miles (65, 66, 67). A longitudinal study of many aspects of personality functioning was made which included such mental factors as memory, imagination, and capacity for comparing, combining, and abstracting. More than 2000 people, ranging in age from 6 to 95 years, were tested. Among the findings was the fact that memory ability is much poorer in older adults than in younger people, the decline being fairly gradual and persistent from age 29 to 55.

This agreed quite closely with previous reports by Willoughby (96) and Jones, Conrad, and Horn (41). For the former study 300 people, ranging in age from 6 to 70, were asked to recall the symbols of the Army Beta digit-symbol substitution test with the result that the older adults did much more poorly than the younger subjects. In the latter study of a sample of 765 people from a rural Vermont population a steady decline with age was observed, particularly after 45, in their ability to recall verbal and pictorial material given in motion pictures. Similarly, Wechsler, in the standardization of his intelligence scale (92) and the Wechsler Memory Test (93), and Shakow, Dolkart, and Goldman (80), in testing 192 normal adults, aged 15 to 90, with the Wells Memory Test, found a progressive decline of memory functioning with increase in age.

Gilbert (29) studied the nature of memory loss in senescence through the administration of a variety of types of tests to two groups of 174 subjects, matched for original intellectual endowment on the basis of a vocabularly test, but differing from each other in respect to age, one group being in the seventh decade of life and the other in the third decade. The tests used were visual, auditory and reversed digit span, sentence repetition, Knox Cube Test, paragraph meaning, memory for designs, paired associates learning, and retention of Turkish-English vocabulary. The younger group was found to be superior in all these tests, the differences between the groups being regarded as measures of memory decline accompanying old age. Rote memory of digits forward and the repetition of simple material, when either meaning or concentration was involved, as in sentence repetition, digits reversed, and the Knox Cube Test, showed relatively little decline.

Similarly Kubo (45), in studying the mental and physical changes in old age, found that among 355 healthy men and women, aged 70 to 100, rote memory did not decline markedly until the eighty-second year of life, but that thereafter it decreased quite rapidly. On the other hand, Gilbert's (29) study also showed that memory which involved the formation of new associations was extremely difficult for senescents, thus pointing to a relative intellectual inflexibility in this age group.

Approximately the same conclusions were arrived at by Halstead (35) in his study of 20 seniles, aged 68 to 83. The old people were found to be best in memorizing by rote, immediate visual recognition, and doing tasks involving early acquired habit patterns. Remembering or learning which involved the reversal of old habits, however, was very poor.

Of interest in this connection is an experiment with a 15 year old dog on whom 12 years of experimentation had been done (72). Trace conditioning could not be produced in this old animal at all, while delayed conditioning was achieved with difficulty. Furthermore, a previously learned discrimination between two

auditory stimuli was lost and during the last half year of life the magnitude of the conditioned salivary response was considerably reduced. On the basis of these findings the experimenter suggested the possibility that in senility, cortical processes of inhibition and excitation are progressively reduced, and that sub-cortical functions are relatively unimpaired. Cameron (6) also considered memory impairment in old age from the viewpoint of the physiologic functioning of the cerebrum. He tried to limit this impairment by increasing cerebral oxygen utilization, but was unsuccessful.

Thus agreement is quite general regarding the relatively poor performance on memory tests of seniles as compared to younger age groups. The decline tends to be most apparent in relation to complex memory functioning involving the learning and retention of new associations and the changing of old mental habits. Remembering simple, meaningful, and non-sense material is somewhat easier for old people, but they are still inferior to the younger groups.

Vocabulary.—Related to memory functioning is performance on vocabulary tests. Sorenson (84) noted in his study of the mental abilities of 641 university extension course students, ranging in age from 16 to 70 years, that there was a steady increase of vocabulary ability with age. Similarly, Christian and Patterson (10) found that the older relatives of a group of college freshmen tended to show an increase in proportion of words recognized for each higher decade of life, even past 60 years of age.

Shakow and Goldman (81), on the other hand, did not find a progressive increase with age in vocabulary level in their study of 203 subjects, aged 18 to 90, controlled for educational attainments. Scores here tended to remain at a constant level through the seventh decade of life, with indications of a slow decline thereafter. Foulds and Raven (23) also found a slight decline. Among their samples of 1047 engineers and 920 male industrial employees it was noticeable by age 60, which is in agreement with the results reported by Wechsler (92) and Heston and Cannell (38).

In addition, Feifel's (19) study of the responses to the Revised Stanford Binet vocabulary test of a group of 45 normal adults, aged 50 to 79 years, as compared to another normal adult group of 68 subjects, aged 15 to 29, suggested possible qualitative deterioration with age of vocabulary functioning. Although no clear-cut differences between the two groups were established, the definitions given by the older adults did tend to be more nearly similar to those of children than the definitions of the younger adults.

Fox (24), however, found no significant differences between vocabulary test scores of two matched groups of persons in the fifth and eighth decades of life, while Halstead (35) reported no essential change in word knowledge with increasing age for his small sample of 20 subjects, aged 68 to 83. Generally, therefore, there seems to be little doubt that ability to define words is not greatly affected by increase in age. Whether or not actual decline takes place with the approach of senility is still an open question, but the evidence does seem to point to the affirmative.

Reasoning and Related Factors.—Perhaps the most important aspect of man's mental makeup is his reasoning power. Many tests have been devised to measure this ability, some of which have been used in the studies of the intellectual functioning of the old age group. Miles (67) reported that the Stanford Later Maturity Research found little decline in accuracy of combining and abstracting ideas with increase in age, but that speed of performance dropped markedly.

The studies of Foulds and Raven (23), Wechsler (92), Halstead (35), and Jones and Conrad (40), however, would seem to indicate that there is a fairly marked decline in the old age groups of their abilities to form comparisons, reason by analogy, exercise judgment, plan for the future, detect similarities, and do arithmetic problems. Comprehension, as measured by ability to grasp spoken directions, was

also found to be considerably impaired in senility (76).

In addition, Dennis (12, 13), using Piaget's test of animism on 50 residents of old age homes, aged 50 to 80 years, discovered regression to earlier stages of animistic concepts in their thinking. On the other hand, Sorenson (84) reported that in testing his 641 subjects with the Minnesota College Aptitude Test and Reading Examination, the curve for paragraph meaning remained relatively constant with increase of age. Along similar lines Wechsler (92) indicated that the subjects of his sample beyond age 40 did not score much lower in comprehension than the younger groups.

Once again, then, the lack of uniformity in intellectual decline that appears to accompany increasing age is evident. It seems quite clear that, as a group, the people past 40 years retain their comprehension, reasoning, and judgment abilities to a considerable degree, as measured by available tests. Many of these tests, however, are not entirely adequate measures for senile subjects since they penalize them excessively in regard to visual and auditory acuity, speed of reaction, educational background, motivation, and recency of practice (56, 63, 84). Thus it may be that the average healthy old man or woman is much more capable than seems apparent.

Speed of Reaction and Intellectual Functioning.—It has already been noted that the speed with which senile individuals may be expected to function intellectually is markedly less than that of younger groups (67). This factor was more closely studied by Ruch (78) in an experiment in which he compared learning efficiency on two motor and three verbal tasks of three groups of 40 subjects, the ages being 12 to 17, 34 to 59, and 60 to 82 years respectively. In each case the scores of the oldest subjects were found to be inferior to those of the other groups.

Gilbert (27) also reported a marked decline of mental efficiency in senescence, as measured by the Babcock Mental Efficiency Tests. She administered these tests to a group of 185 subjects in the third decade of life and to 175 people in the seventh decade and found that none of the younger people's scores fell as low as the mean of the older group. Progressive deterioration in efficiency was noted, furthermore, on the basis of the lower efficiency indices of the 65 to 95 year olds as compared to the 60 to 64 year old subjects. In addition, speed of performance was reduced most sharply in the older group on tasks involving the learning and formation of new associations, perceiving relations, and motor abilities. Simple repetition, giving opposites and general information, however, were relatively least affected by old age.

A variety of other studies tend to substantiate these general results. Ruger and Stoessiger (79) made a statistical analysis of the data Galton had gathered on the motor functioning of several thousand people between the ages of 25 and 81. Swiftness of blow, as well as a variety of other motor reactions, correlated negatively with age. Miles (67) similarly reported an over-all decline in old age to about 70 per cent of maximum in performance efficiency of motor activities such as digital reaction, manual reach and grasp, and foot reaction, reflecting probably the progressive physiologic deterioration accompanying this period of life.

The speed with which 150 subjects, aged 40 to 60 years, reacted to light and sound was studied by Bellis (3). He reported that the oldest individuals required almost twice the time needed by the younger subjects to respond. In addition, males were found to react faster than females in all age groups. Goldfarb's (30) 108 men and 60 women, aged 18 to 65 years, also showed consistent decline with age in reaction time and a tendency for the male subjects to be faster than the females. Similarly, men reacted faster than women in a group of 30 professional subjects, aged 35 to 56 years, tested by Verville and Cameron (91) on an incomplete picture test, while in comparison with 100 college students, aged 16 to 23 years, the responses of the older subjects were relatively slow.

Heston and Cannell (38) tested 1643 subjects ranging in age between 15 and 76 on the

Knox Cubes, the Porteus Mazes, and the Fergusen Form Boards, which are intelligence measures involving rote memory, problem solving, motor abilities, and speed of reaction. A decline with increase in age, particularly past the age of 40, was found. Chen (8) and Tachibana (88) studied a few individuals closely, plotting their motor learning. The learning curves of the old people were discovered to be similar to those of the younger subjects, except that the latter tended to learn faster. In addition, Tachibana noted a failure of transfer from the right to the left hand in simple motor performance.

In another study (90) of the grasping power, tapping speed, and putting-in capacity of the right and left hands for 307 subjects, aged 60 and above, he reported an approach to mutual correspondence. Tapping rate in people between 70 and 100 was also investigated by Kubo (45) and found to decline very slowly with age. He reported, on the other hand, that peg insertion rate was significantly lower in his older subjects. Furthermore, Smith (83) had four groups of men, representing ages of 20, 30, 40, and 50 years respectively, assemble and disassemble two nuts and bolts repetitively over a four hour period, financial incentives being used to simulate industrial conditions. Proficiency was found to be relatively poor among the 50 year olds as compared to the younger groups.

Here again decline in mental efficiency of people who reach senility does not seem uniform, but it is apparent that speed of responsiveness is considerably reduced. Whether the inferior mental test performance shown by old age groups is a function of their reduced speed of reactivity is an important question, since most intelligence measures involve time limits as well as progressive difficulty of items. Miles (63) investigated this problem by administering the Otis Self-Administering Test, Higher Examination, Form A, as a 15 minute speed test to 2000 adults of whom more than 250 were 70 years of age or older. Correlation between score and age was approximately —.5. When Form B of the test was administered without time limit to 433 of the original subjects, score decrement with increase in age was again found, but the decrease was somewhat lower than when speed was a factor.

Similar results were obtained by Copeland (11) in a study of performance by 7500 adults, aged 50 to 75 years, on four forms of the Otis S-A Test, used as work limit mental ability tests in which time required to complete the test was recorded. Decline in both speed and power of performance was found in relation to old age, but speed decreased to a greater degree. These studies, then, would appear to indicate that when people reach old age they undergo an actual deterioration of intellectual abilities.

Lorge (56), however, believed that the deterioration frequently found was more apparent than actual, being in reality a function of the tests used. In administering the I. E. R. Intelligence Scale, CAVD (as a power test), and five speed-power intelligence tests, including the Otis S-A and Army Alpha Tests to 143 adults, aged 20 to 70 years, he found that despite high correlations between these tests, the correlations with age were respectively —.27, —.48 and —.36. In each case age imposed, so to speak, a penalty on the subjects in their performances on the tests, but in relation to the CAVD it was lowest. Matching older with younger subjects for achievement on the CAVD and comparing their scores on speed-power tests, the performance of the older group was found to be inferior. The differences were then used as measures of the extent to which speed affects mental test performance in relation to age, and applied as corrections to the data of the Jones and Conrad (40) and Miles and Miles (64) studies. The calculations showed no essential decline in intelligence as age increased.

On the basis of this analysis it was suggested that the deterioration in old age which does appear may be a function of the mental tests used since the performance of senescents is affected adversely by physical, motivational, and educational handicaps. Actual power or

height of mentality, however, may well be preserved.

Following up this hypothesis, Goldfarb (30) administered the Otis S-A, CAVD, and Wechsler Bellevue Tests to a sample of 168 men and women, aged 18 to 65 years, judged to be fairly homogeneous in intellectual capacities. Whereas there were few or no differences among the age groups on the CAVD and the various Wechsler Bellevue sub-tests which were untimed, the differences favoring the younger groups were significant on all tests in which speed was a factor. Sward (87) also reported a decrease in rate rather than quality of performance on a group of exacting mental tests by 45 university professors, aged 60 to 80 years, as compared to an equal number of younger academic men, aged 25 to 35 years. Among his conclusions was the observation that bright and successful senescents show few unambiguous signs of any decided psychologic decline.

All of this leaves the matter of actual mental deterioration in old age unsettled since no study on a representative population involving follow-up testing over a period extending from early to late maturity is available. Furthermore, there is an apparent need to give consideration to the problem of devising tests which are adequate intelligence measures for older people and which are minimally affected by such factors as decline in physical abilities, reduced motivations, and lack of practice accompanying senility.

Performance and Achievement.—Whether or not people in late maturity suffer actual intellectual deterioration, all studies imply a marked decrease on the part of the aged to utilize their capacities fully. The reduced power to function in daily life activities has not been systematically studied, although a good deal has been written about it subjectively (50, 62, 86). More definitively, a survey by Ford (21) of pedestrain accident rates in relation to age showed people above 45 to be far more accident prone than all younger age groups. DeSilva (14) found automobile drivers above 65 years of age to be extremely unsafe, while those between 50 and 65 were as prone to have accidents, despite their greater cautiousness, as the teen-agers and the characteristically careless 20 to 30 year olds.

On the other hand, there is evidence that individual differences are great among the old age group, so that frequently achievements are on a par with or superior to those of the younger age ranges. Furthermore, various behavior compensations and readjustments are possible which help senescents maintain their performance at a fairly high level. Thus Kossoris (44) surveyed industrial accidents among more than 26,000 employees and found the rate among the 40, 50, and 60 year olds to be lower than that of most of the younger groups. Work efficiency might thereby often be comparable between older and younger workers despite the former's lower speed of reaction. Of interest along these lines is a project reported by Kuh (46) in which careful job placement of older workers in relation to their abilities, training, and personality makeup, as a means of raising their performance to the level of younger workers, was found to be of practical value.

Extensive individual differences in intellectual functioning among senile subjects was noted by several investigators (45, 66, 67, 87), who pointed out that many old people retained their vigor and efficiency on a level comparable to or greater than that of the average of younger individuals. Gilbert (28) also tested 41 regularly employed and 105 unemployed adults aged 60 to 69, with the Babcock Mental Efficiency Tests and showed that the employed group tended to function in a significantly superior fashion. Thus, in the competition for employment, those who retain and are able to utilize their intellectual capacities efficiently seem most likely to maintain their economic and social status.

The studies cited and much other evidence would seem to indicate that the policy uniformly to retire people from employment at a specific age is short-sighted. Dorland (16, 17) compiled the records of 400 famous men in all lines of intellectual activities and found that

the average age at which the best works were produced was 50 years. In addition, a very large number of outstanding achievements are listed on the part of individuals in late maturity. Herre (37) pointed out that old age can be a creative period by calling attention to almost a thousand men and women from various historical periods and of different vocations who were at least 75 years old while still indisputably functioning with much effectiveness.

Considering the field of literature, Heidler and Lehman (36) discovered that authors past the age of 50 continued to be quite productive and that the quality of their work was particularly high in such areas as philosophy, history, critique, and biography. Outstanding literary masterpieces were found by Lehman's survey (53) to be written generally before age 45, but some were produced by older authors. Similarly, in the field of philosophy (54) and music (55), greatest works came from persons below 40 years of age. Older writers and composers tended, however, to turn out a fair quantity and quality of creative achievement.

From the point of view of their potential contribution to society, the available evidence shows that healthy adults in late maturity should not be disregarded. Though handicapped to some extent by physical decline in the use of their intellectual capacities, a fair proportion manage to maintain a very high performance level. As a group they cannot be expected to match the achievements of younger workers, but both the quality and quantity of their productivity can be expected to compare favorably.

Personality Functioning and Adjustments

Personality Characteristics and Adjustments.—A few investigators have used the projective method in attempting to define the general nature of personality structure in old age. Miles (68) suggested that such an approach might be fruitful following his study of the imaginative responses occurring with the visual perception of moving shadows by a group of 1203 subjects, ranging in age from 25 to 90 years. The recorded reactions were of a characteristic kind for the various subjects, being independent of age, intelligence, and education, but not of sex. No follow-up of this method, however, seems to have been made for more than a decade in the personality study of older adults.

Klopfer (43) administered the Rorschach Psychodiagnostic Test to 50 people over 60 years of age, 30 being in a home for the aged, while 20 were not institutionalized. Response patterns for both groups were quite similar, the majority of records being characterized by indications of (a) intellectual impairment, (b) loosening of intellectual ties to reality, (c) inability to make full use of inner resources, (d) difficulty in forming satisfactory social relationships, and (e) reduction in responsiveness to finer emotional stimuli in the environment.

Prados and Fried (75) also studied a group of 35 subjects, aged 50 to 80 years, with the Rorschach test and found that increasing age brings with it an impoverishment of creative intellectual abilities. The subjects between 50 and 70 tended to react to their mental inadequacies with anxiety, while those above 70 seemed resigned to their condition. In addition, the test records showed shallow emotional responsiveness, relatively little inner conflict, and some loss of instinctual control so that primitive manifestations of childhood could be expected at times. Similarly, the Rorschach records of 20 aged white males, hospitalized for various physical disorders, were found by Chesrow, Wosika, and Reinitz (9) to have characteristically a below average number of responses, marked stereotypy of content, intellectual and emotional constriction, and indications of feelings of impotence to deal adequately with their experiences.

The questionnaire types of personality tests have been used in a number of studies which tried to relate social and emotional adjustments to increase in age. In an investigation of neuroticism in marriage, Willoughby (97) administered the Thurstone Personality Schedule

to 105 husbands and 107 wives, ranging in age from 20 to 68. No significant relationship was found between age and neuroticism. Gundlach (34) tested 389 male adults, aged 26 to 64 years, with his own questionnaire and also reported a low, insignificant correlation between age and neurotic tendencies. Similar results were obtained by Simpson (82) who administered the Thurstone Personality Schedule to 252 male penitentiary inmates, aged 18 to 48.

Studying this problem somewhat more extensively, Willoughby (99) again used the Thurstone Personality Schedule to test the emotional stability of 500 unmarried women, 325 unmarried men, and 275 couples, age range being 15 to 75 years. This time he found old age definitely associated with neuroticism, however. Furthermore, women tended to be less well adjusted than men in all ages. In another report (98) on the 500 spinsters he indicated that emotional adjustment tended to be relatively good between the ages of 40 and 50, but that neuroticism increased considerably between the sixth and eighth decades of life.

On the other hand, two studies, using population samples of teachers, suggest good personality adjustment in old age. Phillips and Greene (73) administered the Bell and Bernreuter Personality Inventories to 173 women teachers, ranging in age from 16 to 50, and found good adjustmentment among both the married and unmarried older subjects. Boynton (4) obtained similar results on the basis of his own questionnaire which was completed by 1022 women teachers, aged 16 to 50 years.

Supporting further the idea that old age is a period of good personality adjustment is Gray's report (32) on a more general population of 2000 subjects over 90 years of age. Manifested most predominantly by these individuals was emotional stability. In addition, Doll (15) applied the Vineland Social Maturity Scale to 25 males, aged 50 to 80 years, in an attempt to investigate the applicability of the scale to old age groups. The feebleminded subjects showed no increase in score in relation to past evaluations of them, but the more normal subjects intellectually did manifest social growth.

Feelings of well-being and happiness may be a reflection of healthy personality functioning and may thus also throw some light on people's adjustments. On the basis of interviews with 381 recipients of old age allowances, Morgan (70) and Folsom and Morgan (20) reported that older people associated good adjustment and happiness with (a) good health, (b) pleasant social and emotional relations with friends and relatives, (c) possession of hobbies and outside interests, (d) privacy and independence, and (e) some form of work.

Lawton (53) found almost identical results in the responses of 50 old people to questionnaires and interviews. The period of life considered the happiest by most people of advanced age was noted by both Landis (49), who questioned 450 people over age 65. and Morgan (70) to be middle age (25 to 45 years), the period of life when they tend to work hardest because of their many responsibilities. Kuhlen's (48) results, on the other hand, based on interviews with 300 adults between 20 and 80 years of age, showed young adulthood (20 to 30 years) to be the happiest. Generally, however, all investigations agree that people do not regard senescence as a happy time in comparison with other periods of life.

Personality traits in relation to advancing age were considered by Willoughby (99), who found older people tending toward introversion. Gray (33) administered his own questionnaire, designed to measure psychologic types according to Jung's system, to 1000 subjects, aged 10 to 80. His results also showed introversiveness in older adults. In addition, a decrease in use of the feeling function in judgment and intuition function in perceiving as age increased was reported.

Old age is popularly characterized as a period in which behavior and opinions remain quite fixed. Lorge (57) found social attitudes, as measured by the Thurstone Attitude Scales, of his group of 25 subjects over 45 years of age more consistent than those of a comparable younger group, aged 20 to 25 years. Gundlach

(34), in his previously quoted study, also reported a correlation between age and conservatism, but this was quite small. Along similar lines, Pollak's findings (74), based on expressed opinions about commercial products and social organization of samples of 200 to 4600 people above 40 years of age, indicated a trend toward conservatism in old age, but differences between older and younger groups were small.

Although the evidence is sparse and somewhat contradictory, it seems that old age, for the average of people, does not mean increased emotional instability, despite the new problems of adjustment that are encountered. Earlier periods of life, however, are regarded by them as having been happier. Those who do attain very old age show what appears to be an amazing degree of mental health. On the other hand, the personality of senescents apparently does undergo a decline in such important areas as emotional flexibility and control and social adaptability.

Interests, Attitudes, Beliefs, and Motivation.—A large variety of investigations have been made which describe the changes that occur in the patterns of people's interests, attitudes, beliefs, and motivation as they develop from childhood through old age. Kuhlen's review (47) adequately summarizes and presents an extensive bibliography of the work which has been done in these areas through the summer of 1944. Only the general results as they relate to old age and some additional studies will, therefore, be reported here.

The range of interests of both younger and older adults was found to be broad, but the latter group tended toward activities which are not physically strenuous and socially active. With increase in age, interest in sports, dancing, and other active recreation decreased, while more cultural pursuits, such as reading, art, and religion, increased. Patterns of interests were observed to become fairly well stabilized by age 55, about 50 per cent of the total change taking place between 35 and 55 years. On the other hand, age differences were found to be much less pronounced than occupational and sex differences. Although interests of 15 and 25 year olds respectively were found to correlate very highly with interests of 55 year olds, the small differences between the groups were regarded as crucial in understanding older as compared to younger individuals.

Even though interests remain broad in late maturity, the range and amount of activities participated in apparently decrease. Hobbies, music, and other educational pursuits were found to be more popular with older adults up to about age 75 than with younger groups, but beyond that age a decline appeared. Reading is reported to be an increasingly important activity as people grow older, with newspapers progressively occupying more time than books and magazines. Despite the preference of senescents for sedentary activities, they were reported to be less inclined than younger groups toward movies and radio listening. The latter activity, however, tended to be preferred to reading by older adults.

Very old adults (60 to 90 years) were found to show fewer antipathies and aversions than younger age groups. Up to age 60, however, there tended to be an increase with age in the number of annoyances checked on a questionnaire. On the other hand, Alexander (1) reported a very insignificant correlation between age and the number of antipathies, on the basis of interviews with 716 people, ranging in age from 10 to 50 years. Generally, however, it appeared that aversions change with increase in age and grow out of variations in cultural background, values, increasing infirmities, and time distance from experiences.

Attitudes and interests have been noted to show marked sex differences throughout most of the life span. As males reach old age the over-all pattern of their expressions of preferences and aversions are found to be somewhat feminine. The responses of older females, at the same time, were observed to be more extremely feminine than the younger age groups, thus preserving the marked sex differences in old age.

Reports of investigations of the relationship between opinions and attitudes on political and social issues tend to be contradictory. No reliable age trends were found in studies of conservatism-liberalism and internationalism. On the other hand, some findings indicated that older adults, as distinguished from younger groups, tended to be less pacifistic, less intelligent politically, and more conservative toward the church and Communism. On moral questions generally, age tended uniformly to be related to absolute standards of right and wrong. There were also marked differences between the views on sexual and social behavior of younger and older adults, the latter generally being conservatively traditional.

Attitudes and morale in regard to employment were found generally to be more favorable in older than younger adults, despite feelings of unfair discrimination on the part of employers toward them. Unemployed people over 40 years of age expressed more favorable attitudes than younger individuals toward employers, religion, and the American form of government. Drives for vocational success were found to be much lower among older than younger workers. Instead, the desire for security is reported to play an ever-increasing role as people advance in age. Furthermore, retirement does not seem to mean cessation of activity to them. Chandler (7) found that among 120 respondents to his questionnaire, most people approaching old age expected to be busily engaged following retirement from work. At the same time, available studies showed greater vocational restlessness among older than younger workers, but no clear-cut relationship between age and job satisfaction was demonstrated.

Matters of greatest concern to people as they approach old age are found to be increasingly related to sexual and physical functioning, material things, and spiritual and philosophic values. Their wishes and aspirations are reported as being less realistic than those of younger groups. Church attendance by old people is found to involve religious motives in the main rather than social and cultural interests.

Concern with immortality was observed to be particularly prevalent. In this connection Tachibana's study (89) of the expressed ideas of 385 subjects over 60 years of age is revealing. Ideas of future life, religious feelings, and the contents of prayers were found to be individualistic, immature, and egocentric. Gardner's study (25) of the responses to a questionnaire and interviews of 193 aged people, most of them being past 70 years, gave related results. Considerable preoccupation among them was found with health, even among those whose physical condition was good. Economic independence and social activities also seemed very important to them and day-dreaming was indulged in by most of the subjects.

Preoccupation by senescents with bodily processes was emphasized by Giese's (26) study of people's awareness of the approach of old age through the 350 replies he received to the question, "How did you notice for the first time that you were growing old?" Twice as many physical symptoms were mentioned as mental ones. Some individuals, mainly merchants and artists, denied any feelings of old age. Generally people reported a sudden sense of horror as they experienced being old. On the average, age 49 was subjectively regarded as the beginning of senility. Stern (85), on the other hand, placed the beginning of old age in the fourth decade on the basis of a study of people, biographies, and descriptions in literature. Experiences of physical as well as social, intellectual, and emotional changes are mentioned as accompanying the advent of this period.

Sex drive, according to available evidence, seems to grow weaker with advancing age. Frequency of coitus, autoerotic practices, and love affairs are reported to drop significantly. The extensive study by Kinsey, Pomery, and Martin (42) on the sexual behavior of more than 12,000 males, ranging in age from 15 to 60 years, also indicated a general decline with age of erotic drive and activities.

Generally considered, later maturity and old age are characterized by a variety of changes in the patterns of people's interests, attitudes, beliefs, and motives. To a great extent the changes seem related to physical decline, social, emotional, and economic problems growing out of reduced vocational effectiveness, emancipation from family responsibilities, and the approach of death. Healthy personalities appear to experience relatively little difficulty in adjusting smoothly and easily to their new roles.

Summary

A survey of the research literature on the intellectual and personality functioning of people beyond the age of 40 shows a marked paucity of reliable information in many areas. On the basis of reported findings, however, the following trends seem apparent in the psychology of senility:

(1) Over-all intelligence test performance shows a marked progressive decline in relation to increase in age. On sub-tests such as vocabulary, general information, and reasoning problems in which speed is not a factor, older adults achieve as well as younger subjects. Memory functioning, efficiency of performance, and tasks involving the relinquishing of old habits, however, are found to be difficult for old people.

(2) Healthy old adults are shown to be capable of making significant contributions to culture, industry, and social institutions. Thus the policy uniformly to retire people at a specific age would seem to be short-sighted.

(3) Projective tests show senescence to be associated with a decline in personality functioning in such important areas as emotional flexibility and control and social adaptability. Generally, however, the evidence would seem to indicate that old age does not mean, for the average of people, increased emotional instability, despite the new problems of adjustment they encounter.

(4) Interests of both older and younger adults are broad. The latter group, however, shows a general preference for sedentary activities in contrast to the physically strenuous and socially active interests of younger people. Actual participation in activities, on the other hand, shows a marked decrease with age.

(5) Although wide sex differences in attitudes are maintained throughout the life span, the preferences and aversions of people become increasingly feminine during old age.

(6) Views on sexual and social behavior of older adults are generally conservatively traditional as compared to younger age groups. In regard to opinions on political and social issues, however, the results of various studies are contradictory.

(7) Retirement to older adults does not mean a cessation of activities. On the contrary, interest and desire to remain productive and socially effective are very strong.

(8) People who reach old age seem to become increasingly preoccupied with their health, material things, and philosophic values. Religious ideas and feelings seem to become more personal and egocentric.

(9) Sex drive is found uniformly to decrease significantly as senility approaches.

(10) Many changes in the adjustments of people take place in later maturity in relation to physical decline, reduced vocational effectiveness, emancipation from familly responsibilities, and the approach of death. Healthy personalities seem able to adapt to their new life roles, however, without undue difficulty.

References

1. Alexander, C.: A Correlation Between Age and Antipathy. *J. Social Psychol., 23:* 229-231, 1946.
2. Beeson, M. F.: Intelligence at Senescence. *J. Appl. Psychol., 4:* 219-234, 1920.
3. Bellis, C. J.: Reaction Time and Chronological Age. *Proc. Soc. Exper. Biol. & Med., 30:* 801-803, 1933.
4. Boynton, P. L.: An Anlysis of the Responses of Women Teachers on a Personality Inventory. *Peabody J. Educ., 20:* 13-19, 1924.
5. Brody, M. B.: A Survey of the Results of Intelligence Tests in Psychoses. *Brit. J. M. Psychol., 19:* 215-261, 1943.
6. Cameron, D. E.: Impairment of the Retention Phase of Remembering. *Psychiatric Quart., 17:* 395-404, 1943.
7. Chandler, A. R.: Attitudes Toward Retirement and Old Age. *Am. Psychologist, 3:* 306-307, 1948.

8. Chen, H. C.: Capacity to Learn of an Aged Person. *Chinese J. Psychol., 2:* No. 1, 11, 1923, (*Psychol. Abstr., 1:* abstract No. 2359, 1927.)
9. Chesrow, E. J., Wosika, P. H., and Reinitz, A. H.: A Psychometric Evaluation of Aged White Males. *Geriatrics, 4:* 169-177, 1949.
10. Christian, A. M., and Patterson, D. G.: Growth of Vocabulary in Later Maturity. *J. Psychol., 1:* 167-169, 1936.
11. Copeland, H. A.: Age Differences in Mental Ability as Measured by a Work-Limit Test. *Psychol. Bull., 35:* 642-643, 1938.
12. Dennis, W.: Regression to Childhood Concepts in Old Age. *Am. Psychologist, 3:* 308, 1948.
13. Dennis, W., and Nullinger, B.: Animism and Related Tendencies in Senescence. *J. Gerontol., 4:* 217-220, 1949.
14. DeSilva, H. R.: Age and Highway Accidents. *Scient. Monthly., 47:* 536-545, 1938.
15. Doll, E. A.: Measurement of Social Maturity Applied to Older People. *Train. Sch. Bull., 40:* 69-77, 1943. Also *Pub. Health Rep. Supp.:* No. 168, 138-146, 1943.
16. Dorland, W. A. M.: The Triumph of Maturity. I. The Age of the Master Work. *Welfare Mag., 18:* 1307-1329, 1927.
17. Dorland, W. A. M.: The Triumph of Maturity. II. The Achievements of Maturity Which the World Might Have Passed. *Welfare Mag., 18:* 1444-1466, 1927.
18. Dublin, L. I.: Longevity in Retrospect and Prospect. In E. V. Cowdry (ed.), *Problems of Ageing,* Williams & Wilkins, Baltimore, 1942, pp. 91-110.
19. Feifel, H.: Qualitative Differences in the Vocabulary Responses of Normals and Abnormals. *Genet. Psychol. Monogr., 39:* 151-204, 1949.
20. Folsom, J. K., and Morgan, C. M.: The Social Adjustment of 381 Recipients of Old Age Allowances. *Am. Sociol. Rev., 2:* 223-229, 1937.
21. Ford, A.: Pedestrain Accidents and Age. *Person. J., 8:* 410-412, 1930.
22. Foster, J. C., and Taylor, G. A.: The Applicability of Mental Tests to Persons Over Fifty Years of Age. *J. Appl. Psychol., 4:* 39-58, 1920.
23. Foulds, G. A., and Raven, J. C.: Normal Changes in the Mental Abilities of Adults as Age Advances. *J. Ment. Sc., 94:* 133-142, 1948.
24. Fox, C.: Vocabulary Ability in Later Maturity. *J. Educ. Psychol., 38:* 482-492, 1947.
25. Gardner, L. P.: Attitudes and Activities of the Middle-Aged and Aged. *Am. Psychologist, 3:* 307, 1948.
26. Giese, F.: Erlebnisformen des Alters. Umfrageergebnisse ueber Merkmale personenlichen Verfalls. (Forms of Experience in Old Age. Results of a Questionnaire on the Characteristics of Personal Decline.) *Dtsch. Psychol., 5:* No. 2, 1928. (*Psychol. Abstr., 3:* abstract No. 1515, 1929.)
27. Gilbert, J. G.: Mental Efficiency in Senescence. *Arch. Psychol.,* No. 188, 1935.
28. Gilbert, J. G.: Senescent Efficiency and Employability. *J. Appl. Psychol., 20:* 266-272, 1936.
29. Gilbert, J. G.: Memory Loss in Senescence. *J. Abnorm. Soc. Psychol., 36:* 73-86, 1941.
30. Goldfarb, W.: An Investigation of Reaction Time in Older Adults and Its Relationship to Certain Observed Mental Test Patterns. *Teach. Coll. Contr. Educ.,* No. 831, 1941.
31. Grace, A.: *The Mental Ability of Adults as related to Interests, Needs and Activities.* 80th Annual Report, Cleveland Board of Educ., Div. Adult Educ., 1930.
32. Gray, G. W.: The Mystery of Aging. *Harper's Mag., 182:* 283-293, 1941.
33. Gray, H.: Psychological Types and Changes with Age. *J. Clin. Psychol., 3:* 273-277, 1947.
34. Gundlach, R. H.: Emotional Stability and Public Opinion as Related to Age and Income. *J. Social Psychol., 10:* 577-590, 1939.
35. Halstead, H.: A Psychometric Study of Senility. *J. Ment. Sc., 89:* 363-373, 1943.
36. Heidler, J. B., and Lehman, H. C.: Chronological Age and Productivity in Various Types of Literature. *English J., 26:* 294-304, 1937.
37. Herre, P.: *Schoepferisches Alter.* (Creative Old Age.) Leipzig: v. Hase u. Koehler, 1939. (*Psychol. Abstr., 14:* abstract No. 1982, 1940.)
38. Heston, J. C., and Cannell, C. F.: A Note on the Relation Between Age and Performance of Adult Subjects on Four Familiar Psychometric Tests. *J. Appl. Psychol., 25:* 415-419, 1941.
39. Hofstätter, P. R.: Tatsachen und Probleme einer Psychologie des Lebenslaufs. *Ztschr. f. ang. Psychol. u. Charakterkunde, 53:* 273-333, 1938.
40. Jones, H. E., and Conrad, H. S.: The Growth and Decline of Intelligence: a Study of a Homogeneous Group Between the ages of Ten and Sixty. *Genet. Psychol. Monogr., 13:* 223-298, 1933.
41. Jones, H. E., Conrad, H. S., and Horn, A.: Psychological Studies of Motion Pictures. II. Observation and Recall as a Function of Age. *Univ. Calif. Publ. Psychol., 3:* 225-243, 1928.
42. Kinsey, A. C., Pomeroy, W. B., and Martin, C. E.: *Sexual Behavior in the Human Male.* W. B. Saunders, Philadelphia, 1948.
43. Klopfer, W. G.: Personality Patterns of Old Age. *Rorschach Res. Exch., 10:* 145-166, 1946.
44. Kossoris, M. D.: Relation of Age to Industrial Injuries. *Mo. Labor Rev., 17:* 789-804, 1940.
45. Kubo, Y.: Mental and Physical Changes in Old Age. *J. Genet. Psychol., 53:* 101-108, 1938.
46. Kuh, C.: Selective Placement of Older Workers. *J. Gerontol., 1:* 313-318, 1946.
47. Kuhlen, R. G.: Age Differences in Personality During Adult Years. *Psychol. Bull., 42:* 333-358, 1945.
48. Kuhlen, R. G.: Age Trends in Adjustment During the Adult Years as Reflected in Happiness Ratings. *Am. Psychologist, 3:* 307, 1948.
49. Landis, J. T.: What Is the Happiest Period in Life? *Sch. & Soc., 55:* 643-645, 1942.
50. Lawton, G.: Proposals Regarding Older Workers. *Personnel J., 18:* 300-308, 1940.
51. Lawton, G.: Psychological Guidance for Older Persons. In E. V. Cowdry (ed.), *Problems of Ageing.* Williams & Wilkins, Baltimore, pp. 758-809, 1942.

52. Lawton, G.: Happiness in Old Age. *Ment. Hyg., 27:* 231-237, 1943.
53. Lehman, H.: The Creative Years: "Best Books." *Scient. Monthly, 45:* 65-75, 1937.
54. Lehman, H., and Gamertsfelder, W. S.: Man's Creative Years in Philosophy. *Psychol. Rev., 49:* 319-343, 1942.
55. Lehman, H., and Ingerham, D. W.: Man's Creative Years in Music. *Scient. Monthly, 48:* 431-443, 1939.
56. Lorge, I.: The Influence of the Test Upon the Nature of Mental Decline as a Function of Age. *J. Educ. Psychol., 27:* 100-110, 1936.
57. Lorge, I.: The Thurstone Attitude Scales. II. The Reliability and Consistency of Younger and Older Intellectual Peers. *J. Social Psychol., 10:* 199-208, 1939.
58. Lorge, I.: Intellectual Changes During Maturity and Old Age. *Rev. Educ. Res., 11:* 553-561, 1941.
59. Lorge, I.: Intellectual Changes During Maturity and Old Age. *Rev. Educ. Res., 14:* 438-445, 1944.
60. Madonick, M. J., and Solomon, M.: The Wechsler Bellevue Scale in Individuals Past Sixty. *Geriatrics, 2:* 34-40, 1947.
61. Malzberg, B.: A Statistical Study of Age in Relation to Mental Disease. *Ment. Hyg., 19:* 449-476, 1935.
62. Martin, L. J.: *Sweeping the Cobwebs.* Macmillan, New York, 1933.
63. Miles, C. C.: Influence of Speed and Age on Intelligence Scores of Adults. *J. Genet. Psychol., 10:* 208-210, 1934.
64. Miles, C. C., and Miles, W. R.: The Correlation of Intelligence Scores and Chronological Age from Early to Late Maturity. *Am. J. Psychol., 44:* 44-78, 1932.
65. Miles, W. R.: Measures of Certain Abilities Throughout the Life Span. *Proc. Nat. Acad. Sc., 17:* 627-633, 1931.
66. Miles, W. R.: Abilities of Older Men. *Personnel J., 11:* 352-357, 1933.
67. Miles, W. R.: Age and Human Ability. *Psychol. Rev., 40:* 99-123, 1933.
68. Miles, W. R.: Age and the Kinephantom. *J. Gen. Psychol., 10:* 204-207, 1934.
69. Miles, W. R.: Age and Human Society. In Carl Murchison (ed.), *Handbook of Social Psychology,* Clark Univ. Press, Worcester, 1935, pp. 596-682.
70. Morgan, C. M.: The Attitudes and Adjustments of Recipients of Old Age Assistance in Upstate and Metropolitan N. Y., *Arch. Psychol.,* No. 214, 1937.
71. Mursell, G. R.: Decrease in Intelligence with Increase in Age Among Inmates of Penal Institutions. *J. Juvenile Research, 13:* 197-203, 1929.
72. Pavlova, A. M.: Alterations of Conditioned Reflexes in Old Age. *Trud. fiziol. Lab. Pavlov.,* 1945, 12, No. 2, 224-231. (*Psychol. Abstr., 20:* abstract No. 4088, 1946.)
73. Phillips, W. S., and Greene, J. E.: A Preliminary Study of the Relationship of Age, Hobbies, and Civil Status to Neuroticism Among Women Teachers. *J. Educ. Psychol., 30:* 440-444, 1939.
74. Pollak, O.: Conservatism in Later Maturity and Old Age. *Am. Sociol. Rev., 8:* 175-179, 1943.
75. Prados, M., and Fried, E. G.: Personality Structure in the Older Age Groups. *J. Clin. Psychol., 3:* 113-120, 1947.
76. Price, B.: The Grasping of Spoken Directions as an Age Function in Adults. *Psychol. Bull., 30:* 588-589, 1933.
77. Rabin, A. I.: Psychometric Trends in Senility and Psychoses of the Senium. *J. Gen. Psychol., 32:* 149-162, 1945.
78. Ruch, F. L.: The Differentiative Effects of Age upon Human Learning. *J. Gen. Psychol., 11:* 261-286, 1934.
79. Ruger, H. A., and Stoessiger, B.: On the Growth Curves of Certain Characters in Man (Males). *Ann. Eugenics, 2:* Pts. I & II, 76-110, 1927.
80. Shakow, D., Dolkart, M. B., and Goldman, R.: The Memory Function in Psychoses. *Dis. Nerv. System, 2:* 43-48, 1941.
81. Shakow, D., and Goldman, R.: The Effect of Age on the Stanford Binet Vocabulary Score of Adults. *J. Educ. Psychol., 29:* 241-256, 1938.
82. Simpson, R. M.: Psychoneurotic Inventory of Penitentiary Inmates. *J. Social Psychol., 5:* 56-64, 1934.
83. Smith, K. R.: Age and Performance on a Repetitive Manual Task. *J. Appl. Psychol., 22:* 295-306, 1938.
84. Sorenson, H.: Mental Ability over a Wide Range of Adult Ages. *J. Appl. Psychol., 17:* 729-741, 1933.
85. Stern, E.: *Anfaenge des Alterns: ein psychologischer Versuch.* (The Beginning of Old Age: a Psychological Investigation.) Thieme, Leipzig, 1931. (*Psychol. Abstr., 8:* abstract No. 3665, 1934.)
86. Stieglitz, E. J.: Aging as an Industrial Health Program. *J. A. M. A., 116:* 1383-1387, 1941.
87. Sward, K.: Age and Mental Ability in Superior Men. *Am. J. Psychol., 58:* 443-479, 1945.
88. Tachibana, K.: On Learning Process of the Aged. *Jap. J. Psychol., 2:* 635-653, 1927. (*Psychol. Abstr., 2:* abstract No. 2729, 1928.)
89. Tachibana, K.: (Religious Experiences of Old Men.) *Yokufuen Chosa Kenkyu Kiyo,* No. 11, (*Psychol. Abstr., 11:* abstract No. 2862, 1937.)
90. Tachibana, K.: (Bilateral Differences in Old Age.) *Rep. Sixth Congr. Jap. Psychol. Assn.,* 218-222, 1938. (*Psychol. Abstr., 13:* abstract No. 3076, 1939.)
91. Verville, E., and Cameron, N.: Age and Sex Differences in the Perception of Incomplete Pictures by Adults. *J. Genet. Psychol., 68:* 149-157, 1946.
92. Wechsler, D.: The Measurement of Adult Intelligence, Williams & Wilkins, Baltimore, 1944.

93. Wechsler, D.: A Standardized Memory Scale for Clinical Use. *J. Psychol., 19:* 87-95, 1945.
94. Weiss, E.: Leistung und Lebensalter. (Performance and Age.) *Indus. Psychotechn., 4:* 227-245, 1927. (*Psychol. Abstr., 3:* abstract No. 439, 1929.)
95. Willoughby, R. R.: Family Similarities in Mental Test Abilities. *Genet. Psychol. Monogr., 2:* No. 4, 235-277, 1927.
96. Willoughby, R. R.: Incidental Learning. *J. Educ. Psychol., 20:* 671-682, 1929.
97. Willoughby, R. R.: *Neuroticism in Marriage. J. Social Psychol., 5:* 3-36, 1934.
98. Willoughby, R. R.: The Emotionality of Spinsters. *Character & Pers., 5:* 215-223, 1937.
99. Willoughby, R. R.: The Relationship to Emotionality of Age, Sex and Conjugal Condition. *Am. J. Sociol., 43:* 920-931, 1938.
100. Yerkes, R. M.: Psychological Examining in the U. S. Army. *Memoirs Nat. Acad. Sci., 15:* chap. 14, 1921.

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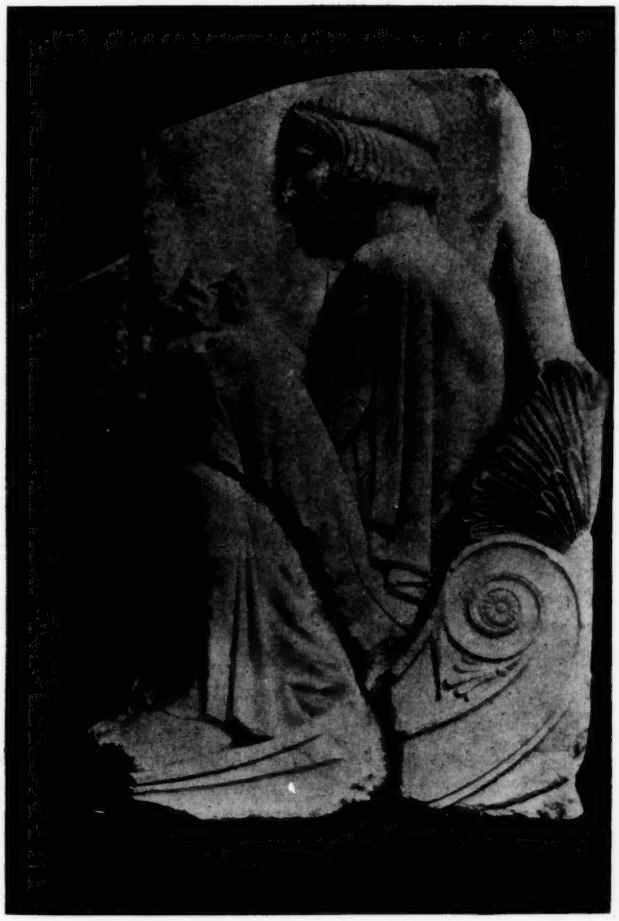
HISTORICAL SECTION



THE OLD WOMAN ON THE LUDOVISI ALTAR, (Boston Museum of Fine Arts). Dr. Bessie Ellen Richardson, author of Old Age among the Ancient Greeks, points out that "this is a remarkable picture of old age for the period (480-740 B. C.) . . . The profile of the old woman reveals a hooked nose; the lips suggest toothless gums; the cheeks are slightly sunken; the chin sags; and the bones of the shoulder almost show through the wasted flesh; the hair is bobbed and treated in rather severe straight waves. It is a picture of respectable old age, not the courtesan type, and the bobbed hair may be taken as a sign of mourning."

F. D. Z.

CURRENT COMMENT

Trend in Publications on Aging

A survey has been made of the number of articles on aging published in ten scientific and medical journals and papers listed in the Quarterly Cumulative Index Medicus during the five year period 1944 to 1948. It will be seen from the table that the publications in the American clinical, pathologic, and anatomic journals do not show any definite increase whereas the number of articles published in the British medical journals have more than doubled in the last few years. A perusal of the Quarterly Cumulative Index Medicus reveals a 100 per cent increase in the number of articles on aging, and the papers listed in the Index are scattered over a large number of journals and the growth is in the general rather than in the scientific publications.

	1944	1945	1946	1947	1948
American Journal Med. Sci.	2	1	1	2	0
Anatomical Record	2	2	2	3	8
Archives of Pathology	2	1	0	3	1
British Medical Journal	5	9	18	24	17
Endocrinology	4	0	2	3	1
J. A. M. A.	19	29	39	31	34
J. Nerv. & Ment. Dis.	1	1	2	2	1
Lancet	3	13	26	41	23
New England Journal of Med.	1	0	1	0	3
Proc. Soc. Exper. Biol. & Med.	2	3	2	2	7
Quart. Cum. Ind. Med.	163	156	253	316	..

The observed difference between the number of articles in the British and American journals included in the table is probably partly explainable by the existence of two American journals exclusively dedicated to publications on aging. Furthermore, several of the listed British publications do not represent original scientific data but deal in a more general way with the problems of old age.

Although there is considerable evidence from many sides that gerontology is attracting increasing interest both here and abroad, the amount of experimental and clinical research work carried out in this field does not yet seem to be proportionate to the importance of this new speciality.

To Add Life to Years

In answer to our question on the origin of the phrase which appears on the cover of the JOURNAL OF GERONTOLOGY, we have received the following letter from Dr. Harry Benjamin, New York.

"Regarding the origin of the phrase 'To add life to years, not years to life,' on which you requested comments in the JOURNAL OF GERONTOLOGY, July, 1949, I would like to state that to the best of my recollection the idea of of this phrase came to me when I wrote an

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The hieroglyphics, "The Beginning of the Book for Transforming an Old Man into a Youth," at the top of this editorial page, are from the Edwin Smith Surgical Papyrus, translated by Professor John Breasted, University of Chicago Press.

article in 1927 with the title, 'The Control of Old Age with Special Reference to Gonadal Therapy.'

"This article appeared in the June, 1927, number of *American Medicine*. At that time it was widely distributed through reprints. I am submitting to you a photostatic copy of the respective page, where you will find the term in the second paragraph.

"It is, of course, possible that before that time I may have heard or read the phrase, retaining it in my subconscious. In such case I would naturally be very much interested in learning the source where somebody may have used the expression before me.

"It is equally possible that independent of my own idea, somebody else's mind may have struck upon the same phrase. If it is a question, however, of who used it for the first time in medical literature, I feel that the above mentioned article of mine answers this question, at least until an earlier reference can be found."

The sentence to which Dr. Benjamin refers reads, "Medical methods for the control of old age, aiming to add *life to years,* not *years to life,* have been and are still being attacked from various quarters and for various reasons."

Life Expectancy in America

According to a study by the Metropolitan Life Insurance Company, based on its 23,000,000 industrial policyholders, the average life expectancy at the age of 68 is 11 more years.

Of each 1000 policyholders alive at 65 years of age, 830 will live to 70, 618 will live to 75, and 382 to the age of 80. Of each 1000 policyholders alive at 20, 702 will live to the age of 65 and 634 to 68.

And from the Office of Vital Statistics comes the report that Americans are living almost two years longer than the prewar life span. The average life expectancy for white women at birth is 70.6 years and for white men 65.2 years, according to calculations based on the 1947 death rate.

Expansion of Social Security System and Public Assistance Program

The House passed, by a vote of 333 to 14, a bill to expand the nation's social security program. It is expected that the Senate will approve the bill at the next session sometime before the 1950 elections.

The bill would add 11,000,000 to the 35,000,000 workers now covered by old-age insurance. Major groups still left out include farm operators, farm hands, and professional persons.

About 2,600,000 persons currently receiving old-age and survivors' insurance benefits would have their monthly benefit increased on the average by about 70 per cent, and persons who retire in the future would have their benefits computed under a new formula.

The public assistance program, which is now costing the federal government about $1,100,000,000 a year, would be increased by another $256,000,000 a year partly by the addition of a fourth category, the totally and permanently disabled.

Organization of Retired Men

A new organization "to increase the security of old age," which its founder, Otis J. Bouma, 70, hopes will become nation-wide was launched in September in Washington, D. C. Mr. Bouma envisions a national headquarters, a state headquarters, and an employment agency specializing in workers over 40 years of age, and many other features.

A letter from a retired man who said he would be glad to work at forced labor in order to eat rather than starve in the midst of a theoretical freedom and who deplored the nation's losing "one of its greatest assests—the experience and judgment of men who have lived an active life for 60 or 70 years," which was printed in a local paper, inspired Mr. Bouma to run an ad asking to hear from retired men "not ready to be shelved" to consider "means of becoming occupied."

This new organization, which attracted more than a hundred people at its second meeting,

serves to focus attention on the employment problem of older people.

The Last Encampment of the G. A. R.

Six Civil War veterans ranging in age from 100 to 108 held their last encampment at Indianapolis in August. The old soldiers were able to attend most of the ceremonies and the meeting attracted nation-wide attention.

Confederate Veterans

According to information received from Dr. Adolph W. Aleck, Mississippi State College, the known number of living Confederate veterans is thirty. Dr. Aleck suggests that this large group of centenarians might be useful for clinical research on aging.

Elders in the News

From Ripley comes the report of Sze Tsien of Shantung, China, who started life as a sickly quintuplet and lived to the age of 130 years. His four sisters died at birth.

Ed Harris, of Decatur, Illinois, who was 111 March 20, 1949, went around the world three times, with a circus, on a colonizing expedition to Africa, and as an adventurer, spending time in Africa, Finland, Sweden, Norway, Scotland, and France. He scouted for General Grant in the Civil War and spent the last 79 of his years in Decatur working for a railroad, trading horses, and driving carriages.

Mrs. Hedwig Slazyk, 105 October 15, decided to stay at home on her birthday this year. Last year on her birthday she walked four miles from her home to pick mushrooms.

From Bournemouth, England, comes the advise from 105 year old Mrs. Elizabeth Whitehead, "Never hurry."

"Grandma" Susan Stewart, who celebrated her one hundred second birthday in 1949 remarked that she likes living so well she would like to do it all over again, but with one difference—instead of being a housewife she would go into business.

"I feel better now than at 99," said Mrs. Henriette C. Sargent of Mount Holly, New Jersey, on her one hundred second birthday, August 29.

Angry when someone smashed a window in his home, 102 year old Charles Chappell of Long Beach, California, hopped into his Autoette and raced to the police station. "We didn't tolerate malicious mischief in the Union Army, and I still don't like it," he told officers.

Mrs. Johanne Trenz, born in Germany 100 years ago January 13, finds that television has opened a new field of entertainment for her.

Mrs. Salome Chiera of Grosse Pointe, Michigan, who interrupted leaf raking at her home to give a demonstration of how she touches her toes to "keep from getting stout," observed her one hundredth birthday in 1949.

A samba dance at the Stork Club marked the ninety-seventh birthday of Mrs. Robert Jerome Faulkner, New York.

An immigrant at the age of 96 years, Mrs. Elizabeth Rugieniene of Lithuania, is the oldest displaced person thus far to enter the United States.

Mrs. Permelia Howell, 94 years old, of Sellersburg, Indiana, took her first plane ride at Louisville in August.

Dr. Andy Hall of Mount Vernon, Illinois, at the age of 84 was named the outstanding general practitioner for 1949 by the American Medical Association.

The eight attendants at the wedding of Charles Ward, 82, and Mrs. Catherine Ginther, 67, were her great grandchildren.

In order to prove that growing old is "nonsense," Bernard Macfadden, 81, year old physical culturist, successfully completed his first parachute jump.

Although Dr. David H. Bokhof, 80, of Freeport, Illinois, did not take up tennis until he was 45, he still plays regularly three time a week and presents stiff competition to players 50 or 60 years younger.

Seventy-three-year-old Mrs. Kate Logan Bennett, received her A.B. degree in a wheel

chair August 17 at University, Mississippi. Recovering from virus pneumonia, she got up from her hospital bed, put on a cap and gown, and received her diploma from Chancellor J. D. Williams of the University of Mississippi.

News and Notes

The first International Gerontological Conference will be held at Liège, Belgium, July 10-13, 1950, under the sponsorship of the Belgian Gerontological Society. At the Annual Business Meeting of the Gerontological Society held in Chicago November 5, 1949, Dr. E. V. Cowdry was appointed Chairman and Dr. Robert A. Moore, Dr. A. I. Lansing, Dr. Nathan W. Shock, and Dr. A. J. Carlson were appointed members of the Committee to represent the American Gerontological Society at the International meeting.

The one hundred eighteenth annual meeting of the British Medical Association will be held at Liverpool July 18-21, 1950. The Joint Secretary, L. Z. Cosin, F.R.C.S., Langthorne Hospital, Leytonstone, London, E. 11, England, would appreciate hearing from American physicians interested in geriatrics who would wish to present papers at the meeting or take part in the discussions.

The British Medical Society for the Care of the Elderly met at Bermondsey Medical Mission Hospital October 28, 1949. The next meeting will be at St. Pancras Hospital, St. Pancras Way, London, N.W. 1, February 3, 1950, and the following meeting will be in Leeds, April 21 and 22.

The Club for Research on Ageing met February 6 and 7 at the Hotel Beekham, New York.

Dr. George E. Myers, Professor Emeritus of Education at the University of Michigan, joined the staff at the Moosehaven Research Laboratory, Orange Park Florida, as Research Associate in October, 1949. His principal research will be with the community activities and recreation of the residents of Moosehaven.

Mr. Robert W. Arms, formerly personnel technician with the Student Personnel Bureau of the University of Illinois, has joined the staff as Research Assistant.

ORGANIZATION SECTION

C. J. VAN SLYKE, *President*
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National Institutes of Health
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JOHN ESBEN KIRK, *Treasurer*
5600 Arsenal Street
St. Louis 9, Missouri

ROBERT A. MOORE, *President-Elect*
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Minutes of the Special Meeting of the Council of Gerontological Society, Inc.

Held on November 5, 1949

The meeting was called to order at 1:00 P.M. on November 5, 1949, in the Great Lakes Room of the Hotel Knickerbocker, Chicago, Illinois.

Members of the Council present were: Ernest W. Burgess, Clive M. McCay, Robert A. Moore, Nathan W. Shock, Henry S. Simms, C. J. Van Slyke, and Frederic D. Zeman.

Absent were: Joseph C. Aub, Walter Bauer, George E. Johnson, Oliver H. Lowry, William Malamud, and George B. Wislocki.

Others present were: John Esben Kirk and Marjorie Lawson.

A copy of the Notice of the Meeting, mailed to all the members of the Council, was presented by the Secretary and was ordered filed with the minutes.

The minutes of the Fourth Annual Meeting were read and approved.

Dr. Moore presented a report of the Editor-in-Chief of the JOURNAL OF GERONTOLOGY. This was approved and ordered filed with the minutes.

Editor's Report for 1949

With the publication of the October issue in the middle of October this year the JOURNAL OF GERONTOLOGY has attained its publication schedule and there are sufficient papers on hand for the January issue as well as some for other issues during the coming year.

There were 360 pages and 35 original papers in volume 4 covering the following fields:

Biologic and medical sciences	20
Social sciences	7
Humanities	1
General	7

Fifty-seven papers were submitted for publication as of November 1, 14 more than last year and 28 more than in 1947; 10 were rejected, and 12 are as yet unpublished.

Other statistics on the editorial make-up of volume 4 according to sections are:

Current Comment	25 items
Book Reviews	16 books
Gerontologic Reviews	6 topics
Organization Section	30 pages
Index of Literature	43 pages

This year the program and abstracts of the Annual Scientific Meeting were published in the Organization Section of the October issue instead of as a separate supplement. The number of pages in the Index to Current Periodical Literature is less this year than last because of the shorter interval between publication of the issues. With the April issue the Journal has commenced the reproduction of old illustrations pertaining to gerontology in connection with the historical section of Browsing Through the Ages.

Four new foreign correspondents were appointed to the Editorial Staff this year: Dr. Bourlière for France (replacing Dr. Courrier, who resigned), Dr. Vega Diaz for Spain, Dr. Geill for Denmark, Dr. Hanssen for Norway, and Dr. Jalavisto for Finland. Four reviews of European gerontologic activities were published and in addition four other papers were submitted from foreign countries.

The subscription list as of November 1 is 926, higher than at any time since the initiation of publication. At the end of 1948 there were 840 subscribers; the list dropped down to 681 by the middle of March but has risen steadily since then. The number of members of the Gerontological Society has increased from 179 on December 1, 1948 to 285 by December 1, 1949 (271 of whom have paid their dues and are receiving the Journal). In addition there are four new members for 1950.

The balance of the new subscriptions were obtained through direct mail campaigns and exhibits at conferences on aging. Promotional letters were sent to hospitals in the United States and Canada, homes for the aged, endocrinologists, social work libraries, welfare agencies, and former subscribers, and the results are considered to be well worth while. Exhibits were held at the Institute on Problems of Aging in St. Louis in April, at the National Conference of Social Work in Cleveland in June, and at the Institute on Problems of Aging in Chicago in August. In addition, exhibit copies of the Journal are being sent to various other meetings.

Because of the larger number of subscribers and advertisers and the increased subscription rate, it is anticipated that while a deficit of approximately $2500.00 will be shown at the end of 1950, there will still be a balance of about $6500.00 in the combined Journal and Editorial Office bank accounts at the end of next year.

ROBERT A. MOORE, Editor-in-Chief.

Dr. Moore pointed out that Dr. Kirk is the Managing Editor of the Journal. Dr. Zeman recommended that advertisements of books be solicited for the Journal. Dr. Burgess recommended special issues of the Journal on special subjects in order to increase the subscription list. Dr. Kirk recommended increasing the number of members in order to expand the subscription list.

The Treasurer presented a report of the Corporation as of October 26, 1949, stating that the annual audit would be available at the end of the year. Upon motion duly made, seconded, and carried, this report was approved and ordered filed with the minutes.

Dr. Moore presented the proposed budget for 1950 and quotations from printers for printing the Journal in 1950. Dr. Simms moved that the Editor-in-Chief be authorized to use his judgment in the selection of a suitable printer. The motion was seconded and passed.

Dr. Moore recommended that membership dues should not be increased but that a registration fee be charged for the annual meetings. Dr. Van Slyke moved that a registration fee of $2.00 for both members and nonmembers be charged, but that the registration be free to interns and medical and graduate students. This motion was seconded and carried.

It was recommended by Dr. Kirk that there

be some discussion about papers and gerontologic reviews for the Journal.

The following officers were nominated to serve during the year 1950 and until election and qualification of their successors:

President	C. J. Van Slyke
President-elect	Robert A. Moore
Treasurer	John Esben Kirk
Editor-in-Chief	Robert A. Moore
Secretary	Henry S. Simms

The motion was made that the retiring president sit in with the Council for one year and Dr. McCay was invited to attend meetings of the Council.

The question of an international association of Gerontological Societies was discussed. It was suggested that since this is a matter of interest to all the members, the question should be discussed at the business meeting.

Meeting adjourned at 1:30 P.M. until 5:00 P.M.

Meeting reconvened at 5:00 P.M. in the Ballroom of the Hotel Knickerbocker.

Dr. Shock presented a report of the Membership Committee. This was approved and was ordered filed with the minutes.

Report of Membership Committee

Early in the year a letter was sent to all members of the Society requesting names of persons qualified for membership in the Society. A self-addressed, stamped envelope was provided for easy reply.

Letters of invitation to join the Society were sent to all names suggested. A total of 106 new members were obtained during the year.

TABLE I. MEMBERS

Total full membership, December 1, 1948.....		179
New Members (1949).....		106
		285
Deaths	1	
Members in arrears for 2 years.....	11	
		12
Total full membership, December 1, 1949.....		273

TABLE II. MEMBERSHIP OF GERONTOLOGICAL SOCIETY BY FIELDS OF INTEREST

FIELDS OF INTEREST	Year			
	1946	1947	1948	1949
Clinical Medicine	43	73	101	164
Botany	1	1	1	1
Anatomy and Pathology	9	15	16	19
Biochemistry	4	4	5	6
Physiology	7	9	16	22
Psychology	6	9	14	22
Sociology	5	5	6	12
Social Work and Institutional Administration	2	6	11	18
Nursing	0	0	1	2
General	3	5	8	19
Total Members	80	127	179	285

The present membership status of the Society is shown in Table I. Table II presents a summary of the membership of the Society distributed according to areas of interest. It is apparent that additional members are needed particularly in the fields of biologic and social sciences.

In view of the increasing interest in gerontology, it should be possible to expand our membership among those concerned with the practical problems of dealing with elderly people either individually or in institutions. The Membership Committee will welcome names and addresses of qualified individuals who should be members of the Society.

N. W. Shock, Chairman

Dr. Wislocki's report of the Registry Committee was presented. Dr. Moore recommended that both moral and financial support of the Registry be continued but that the recommended financial contribution not be paid until there is a significant amount of material in the Registry. Dr. Moore moved that the report be accepted and the Treasurer of the Society be authorized to pay to the American Registry of Pathology a sum not to exceed $300.00 in support of the Registry. The motion was duly seconded and carried.

Report of the Committee Appointed by Gerontological Society, Inc., To Consider the Activation of the Registry of Gerontologic Pathology

In 1945, the Registry of Gerontologic Pathology was organized under the auspices of the Society for the Study of Ageing (now the Gerontological Society, Inc.) for the purpose of affiliation with the American Registry of Pathology, a department of the Army Institute of Pathology, Washington, D. C. To date, this Registry has been inactive. The function of the Registry of Gerontologic Pathology should be to collect material which would be made available to people interested in investigation or teaching in the subject of gerontology. In 1949, the Council of the Gerontological Society appointed a Registry Committee, composed of Drs. Walter W. Jetter, William deB. MacNider, and George B. Wislocki, Chairman, to investigate the desirability of activating the Gerontologic Registry and to submit a report and recommendation to the Society regarding this question. The Committee herewith makes its report.

The Army Institute of Pathology is the pathologic department of the Army Medical Corps and the Veterans Administration. One of its 4 major departments is the American Registry of Pathology. This Registry operates jointly under the supervision of the Director of the Army Institute of Pathology and the National Research Council's Committee on Pathology. The latter advises in administrative, professional, and financial affairs. The National Academy of Science acts as fiscal agent for the disposal of the annual budget provided by the Committee on Pathology.

The Army Institute of Pathology employs 16 pathologists chosen on the basis of their training and diversity of interests, thus providing expert assistance in all of the varying specialities in pathology. Dr. Gustavus Klinck has been appointed recently as the pathologist in charge of Gerontologic Pathology, and is available for the examination, preservation and

storage of all material submitted to him. Such accumulated material can then be placed on file in the Institute and information regarding it can be coded on IBM cards for future reference.

When incoming pathologic material comes within the scope of more than one registry, the other agencies involved are notified of it and corresponding notations made. By such means, liason between the Institute and professional groups throughout the country is effected. There appears to be no question as to the value and usefulness of the various Registries. A collection of pathologic material is made available at a central location that cannot be duplicated elsewhere. Visitors may utilize the resources of the organization for scientific research or teaching. The Institute furnishes loan sets, photographs, atlases, and publications that have proved to be of outstanding value. There seems to be little that the Society for the Study of Aging could lose by a continuation of their affiliation and much that they could gain in the event that its Registry were to become activated.

The committee has given considerable thought to the proper manner in which this activation should be effected. The question of primary importance is the type of material that should be collected. Gerontology is the study of the phenomena of old age. Death during the senile state may be caused by widely diversified types of degenerative and infectious diseases that are also found at other age periods. Many of these diseases already constitute the main focus of attention for other already fully established and functioning registries. Thus, there are several Registries devoted to the study of cancer in one or other form, a registry of orthopedic pathology, and one of cardiovascular diseases. Tissues from senile persons falling into one of the above categories of disease would be more properly catalogued by one of these Registries than under Gerontology.

What then should be the function of a Registry of Gerontology? The committee believes that attention should be focused primarily upon the "normal" morphology of aging. Comparison of senile tissues with material obtained from younger people may lead to more definitive information regarding the senile state and how and why it comes about. The specific disease process or processes that may have been immediately responsible for death is regarded as being of secondary importance unless there appears to be some connection with the aging process per se.

It is proposed also that the tissues of aging and senile animals should be deposited with the Registry. Experimental studies on domesticated animals, in reference to the effects of diet and endocrine factors on the processes of aging, are being carried on in a number of American laboratories. The Registry would be a suitable place for the ultimate deposition of the material emanating from such experiments. Finally, the tissues of wild animals, obtained from zoological gardens and other sources, should be worthy of suitable preservation and study by the Registry.

These considerations have been responsible for the following recommendations of the Committee:

1. The Registry of Gerontology, which was established in 1945, should be activated.
2. The primary purpose of the Registry should be the collection and processing of material from old people. The material should be filed according to both the individual organ or tissue and the decade of life. For comparison, material from younger people should also be collected and filed in a corresponding manner.
3. The Registry should be made the repository for material illustrating the changes of age and senility in wild and domesticated animals. Material derived from animal experiments designed to analyse the roles of diet and endocrine factors in the process of aging should also be collected by the Registry.
4. Information concerning the Registry and its activation should be conveyed to the members of the Gerontological Society.

5. It is customary for the society sponsoring a registry to make a small token contribution to the Registry Budget. It is suggested that the sum of $300.00 be appropriated for the first year.

WALTER W. JETTER
WILLIAM DEB. MACNIDER
GEORGE B. WISLOCKI, Chairman

Dr. Moore suggested that a committee be appointed to consider association of Gerontological Society with other scientific societies having similar interests.

Plans for the 1950 annual scientific meeting of the Gerontological Society were discussed and it was decided to postpone action, leaving the decision to the Executive Committee consisting of the officers of the Society.

There being no other business, upon motion duly made, seconded and carried, the meeting was adjourned.

HENRY S. SIMMS, Secretary.

Minutes of the Second Business Meeting of Gerontological Society, Inc.

The meeting was called to order at 1:30 P.M. in the Ballroom at the Hotel Knickerbocker, Chicago, Illinois, on November 5, 1949.

Dr. Clive M. McCay, President of the Society, acted as Chairman of the meeting. Dr. Henry S. Simms acted as Secretary. About 60 members of the Society were present.

Dr. Moore presented the Editor's Report and acknowledged Dr. Kirk's assistance as Managing Editor. Dr. Kirk pointed out the scarcity of experimental papers and gerontologic reviews offered to the Journal and suggested that members of the Society submit more of these papers for publication. Dr. McCay called for suggestions on increasing the subscription list.

Dr. Moore presented the Treasurer's Report and reported that it was the decision of the Council that a registration fee of $2.00 should be charged both members and nonmembers attending future meetings, but that interns and medical and graduate students be admitted free of charge.

Dr. Cowdry raised the question of methods of increasing membership in the Society. It was suggested that members solicit applications from those of their friends who may be qualified to become members. It was pointed out that application blanks may be obtained from the Secretary or from the Chairman of the Membership Committee.

Dr. Cowdry presented a letter from Dr. Korenchevsky recommending an international organization concerned with gerontology and spoke of the proposed meeting to be held in Europe next summer to attempt to organize an International Gerontological Society or an International Association of Gerontological Societies. Dr. Cowdry moved that a committee to consider the international organization be appointed by the President. Dr. Geill spoke on the subject. Motion was made and passed that Dr. Cowdry be appointed Chairman of the Committee and that Drs. Moore, Lansing, Shock, and Carlson be members of the Committee.

Dr. Simms listed the present officers and members of the Council and presented the Council's nominations for the following officers to serve during the coming year:

President	C. J. Van Slyke
President-elect	Robert A. Moore
Treasurer	John Esben Kirk
Editor-in-Chief	Robert A. Moore
Secretary	Henry S. Simms

and the following members of the Council, each to serve for a period of three years:

Ephraim Shorr (to represent the Medical Research Section).

Nathan W. Shock (to represent the Biological Research Section).

Ollie A. Randall (to represent the General Section).

Dr. Stieglitz stated that he thought the retiring President should be elected to serve as a member of the Council, representing his respective section of the Society. He nominated Dr. McCay to serve as representative of the Biological Research Section. The Secretary pointed out that the Council had invited Dr. McCay, as retiring President, to sit with the Council during the coming year.

After some discussion, upon motion duly made, seconded, and carried, the following officers and members of the Council were elected to serve during the year 1950 and/or until the election and qualification of their successors:

President	C. J. Van Slyke
President-elect	Robert A. Moore
Treasurer	John Esben Kirk
Editor-in-Chief	Robert A. Moore
Secretary	Henry S. Simms

Ephraim Shorr (to represent the Medical Research Section).

Nathan W. Shock (to represent the Biological Research Section).

Ollie A. Randall (to represent the General Section).

Dr. Katz moved that the policy that the retiring President sit in with the Council during the year following his retirement be referred to the Council for further discussion and that this be reported on at the next business meeting of the Society. This motion was duly seconded and carried. The Society also approved the action of the Council in inviting Dr. McCay to sit in at its meetings during the ensuing year.

It was pointed out that this was a special meeting rather than an annual meeting of the Society, and that the new officers would not normally take office until the annual meeting in 1950. Upon motion duly made, seconded, and carried, it was voted that the new officers take office on January 1, 1950.

A motion was made of appreciation to Dr. Kountz and the Program Committee for their work on the program of the Second Scientific Meeting and to Dr. Davis for the local arrangements.

The Chairman announced that the Council had not yet made plans for the next Scientific Meeting and that arrangements will be announced later.

There being no other business, upon motion duly made, seconded, and carried, the meeting was adjourned.

HENRY S. SIMMS, Secretary.

Officers and Council of Gerontological Society, Inc., 1950

President	C. J. Van Slyke
President-elect	Robert A. Moore
Treasurer	John Esben Kirk
Editor-in-Chief	Robert A. Moore
Secretary	Henry S. Simms

Medical Research:	*To Serve Until:*
Frederic D. Zeman	1951
Joseph C. Aub	1952
Ephraim Shorr	1953

Biological Research:

George B. Wislocki	1951
Oliver H. Lowry	1952
Nathan W. Shock	1953

General:

Ernest W. Burgess	1951
George E. Johnson	1952
Ollie A. Randall	1953

Gerontological Society, Inc. Committee Members for 1950

Membership Committee:

Nathan W. Shock, Chairman
Gerontology Section, U.S.P.H.S.
Baltimore City Hospitals
Baltimore 24, Maryland

Warren Andrew
Department of Anatomy
George Washington University
Washington 5, D. C.

Oscar J. Kaplan
San Diego State College
San Diego, California

Frederic D. Zeman
Home for Aged and Infirm Hebrews
New York, New York

Program Committee:

Clive M. McCay, Chairman
Cornell University
Ithaca, New York

Robert J. Havighurst
Committee on Human Development
University of Chicago
Chicago, Illinois

Ephraim Shorr
Cornell University
Medical School
New York, New York

Edward J. Stieglitz
1726 Eye Street, N. W.
Washington, D. C.

Registry Committee:

Wilhelm C. Hueper, Chairman
National Cancer Institute
National Institutes of Health
Bethesda 14, Maryland

Walter W. Jetter
Harvard Medical School
Boston, Massachusetts

Albert I. Lansing
Department of Anatomy
Washington University School of Medicine
St. Louis 10, Missouri

Publication Committee:

Roy G. Hoskins, Chairman
86 Varick Road
Waban, Massachusetts

Ernest W. Burgess
Dept. of Sociology
University of Chicago
Chicago, Illinois

Frederic D. Zeman
Home for Aged and Infirm Hebrews
New York, New York

Affiliation Committee

E. Cowles Andrus, Chairman
24 East Eager Street
Baltimore 1, Maryland

Clive M. McCay
Cornell University
Ithaca, New York

The Gerontology Advisory Committee of the National Institutes of Health

The Gerontology Study Section which has been functioning for the last three years has now been disbanded and a Gerontology Advisory Committee has been organized with broader responsibilities.

The Committee will analyze the research grant program in relation to the field of gerontology (including geriatrics) and will report to the Public Health Service and to the various Councils, making such recommendations for revision in emphasis as may seem advisable. The Committee will consider the possible bearing on gerontology of every application for a grant. It will, in suitable instances, submit appraisals to the Study Sections to which these are assigned.

One of the main functions of the Committee is to stimulate research pertinent to the development of knowledge related to gerontology. The term "gerontology" is used to cover not only the study of senescence, but also to include investigations relative to the diseases of older people. Individuals conducting or contemplating gerontologic research are invited to communicate with one of the members of the Committee. The members are:

Henry S. Simms (Chairman)
Ernest W. Burgess
Frank Fremont-Smith
Clive M. McCay
Robert A. Moore
Nathan W. Shock
Ephraim Shorr

BOOK REVIEWS

CARE OF THE AGING

GERIATRIC MEDICINE, The Care of the Aging and the Aged, 2nd edition, Edward J. Stieglitz, W. R. Saunders, Philadelphia, 1949, 773 pages, $12.00.

The first edition of Stieglitz' book, which appeared in 1943, was soon out of print and a new revised edition has now been issued. A total of 47 clinicians and scientists have contributed to the book, and Stieglitz has personally written 5 out of the books' 44 chapters, among these the very important sections on Foundations of Geriatric Medicine, Principles of Geriatric Medicine, and Medical Care of Normal Senescents.

Stieglitz emphasizes that geriatrics should not be considered as a specialty in the usual sense of the word but that it covers a wide field and cross-sections the various specialties included in modern medical science. For this reason geriatrics requires the cooperation of nearly all fields of medicine. Geriatric medicine is not limited to the clinical problems of the obviously senile individual but includes also the functional and organic changes which occur a long time before the onset of senility.

From the point of view of preventive geriatrics the period between the age of 40 and 60 is the most important. Stieglitz calls attention to the fact that the conception of health is a relative one and that much can be attained through the care and treatment of aging persons so that they may live their last years in reasonable comfort. It is not only the purpose of geriatrics to prolong life but also to add value to it. Of great beauty is the motto for the book: The longer men live the more time there is to think. To think is to grow, and, growing, live.

Carlson gives a survey of the physiologic changes of normal aging and emphasizes that nearly all the changes in the machinery of the body point to a gradual depletion of the hereditary tissue reserves or "factors of safety" so that the aging individual becomes gradually less able to meet the usual accidents and the unusual stresses of living. Oliver, who has written the chapter on anatomic changes of normal aging, concludes that a valuable scale for the determination of the age of a man could be established on the degree of senescent change that has occurred in the individual as a reaction to his environment. Life periods might be set up on the basis of the structural changes that had so developed and these correlated with their functional characteristics.

The mental changes with normal aging are described by W. Miles and C. Miles. Old employees give stability and continuity to the life of industry and in turn derive psychologic encouragement and effective invigoration from contact with younger associates.

Zeman has written a brilliant chapter on medical care of the normal aged. The reviewer, who has visited the "Home for Aged and Infirm Hebrews" in New York, directed by Zeman, can wholeheartedly characterize it as an ideal residence for old individuals.

In his chapter entitled Principles of Geriatric Surgery, Fishback concludes that the ability of the aged when properly prepared and cared for to withstand extensive surgical procedures has been underestimated.

In the section dealing with disorders of metabolism, malnutrition, diseases of the blood, diabetes mellitus, gout, and dysfunctions of the endocrine glands are discussed. The nutrition-

al and metabolic problems are unquestionably among the most important in geriatrics.

Overholser gives a survey of mental diseases and concludes that in general the prognosis for any mental disorder occurring in later years is not particularly good but much can nevertheless be done to make the patient more comfortable and easier to take care of. In the chapter on organic diseases of the brain, spinal cord, and peripheral nerves, Camp points out that toxic substances from the lower bowel, rectum, and genito-urinary system may be important factors in the etiology of the degenerative diseases of the nervous system in old age.

The normal senile heart is discussed by Sprague. Abnormal cardiovascular aging is only to be discovered through the history of angina pectoris or its painless equivalents. Certain minor electrocardiographic changes with age may be significant, and for this reason the recording of a control electrocardiogram at middle life may be useful in advising restrictions in later life as a feature of preventive geriatrics.

In the chapter by Stieglitz and Kimble on the nephropathies attention is directed to the fact that the fine line of demarcation between normal and pathologic renal change with advancing age cannot be defined. Renal disease in the senescent and senile must be discovered before it becomes obvious if irreparable renal damage is to be avoided.

The very significant chapters on diseases of the joints and of the bones are written by Monroe and Steindler respectively. The senile osteoporosis and osteomalacia are undoubtedly much more frequent than is generally assumed.

The fact that so many authors have participated in the preparation of the book must necessarily lead to differences in style and manner of presentation, and unfortunately several of the chapters are not followed by literature references. In spite of this Stieglitz' book must be designated as the unquestionable leader in its field. The first edition contributed greatly to the increasing interest in geriatrics noted in the last few years, and the new edition will do so to an even higher degree. Stieglitz' book is indispensible for every physician who desires knowledge of and insight into geriatric medicine. The book is well printed with excellent figures and instructive tables and diagrams.

T. Geill

REPORTS OF THE NATIONAL HEALTH ASSEMBLY

AMERICA'S HEALTH, A Report to the Nation by the National Health Assembly, Harper and Brothers, New York, 1949, 395 pages, $4.50.

This volume contains the official findings and recommendations of the Assembly on public health policy. This Assembly met in Washington, D. C., for a four day session during the first week of May, 1948, and was attended by some 800 representatives of professional organizations and public and private agencies concerned with the matters of health throughout the United States. This book is not to be confounded with the "Nation's Health, a report to the President" by Oscar R. Ewing, Federal Security Administrator. The latter is a partisan presentation of the same data and emphasizes the alleged need for compulsory health insurance.

In the volume under review, each section of the National Health Assembly presents its report with its recommendations. An extremely interesting chapter is devoted to a discussion of chronic disease and the aging process, in which physicians, social workers, educators, public health officers, and laymen participated. The conclusions and recommendations of this section are featured under the heading of general concepts, the role of research and training and clinical techniques in chronic disease control, the noninstitutional care of the chronically ill, and the utilization and employment of the chronically disabled. It is interesting that the

delegates had difficulty in determining the relations of chronic disease to the aging process and that a motion to change the name of the section to Section on Chronic Disease was defeated.

The National Health Assembly represents the first step in coordination on a nation-wide basis of the innumerable agencies concerned with the health of our people. The many fields of agreement as well as the spirit in which the delegates met offer real hope that a common meeting ground and field of agreement may be attained by the advocates of voluntary health insurance plans and those who so strongly urge the compulsory variety. Reading this report will give practicing physicians, as well as social workers, a broad over-all picture of the country's needs that is rarely attainable within the confines of a single volume.

F. D. ZEMAN

RESEARCH IN ADJUSTMENT OF THE AGED

PERSONAL ADJUSTMENT IN OLD AGE, R. S. Cavan, E. W. Burgess, R. J. Havighurst, and H. Goldhamer, Science Research Associates, Chicago, 1949, 204 pages, $2.95.

This is a relatively nontechnical report which summarizes the authors' research efforts in their study of personal adjustment in old age. In less than 150 pages there is reviewed the work of a project undertaken for a subcommittee on Social Adjustment in Old Age, established by the Social Science Research Council's 1944 Committee on Social Adjustment. The remaining quarter of the book consists of a detailed Appendix supplementing the text.

The goals of the report are: "(1) to define and to analyze the nature, patterns, and problems of personal adjustment to aging; (2) to present the available facts about old age derived from census data and from a special survey of 2,988 older persons made by the authors; and (3) to describe two instruments for measuring adjustment in later maturity, one an Inventory of Activities and the other an Index of Attitudes." The authors hope, through the publication of their study, to reach research workers, those serving the aged, teachers and students of the problems of older persons, and the general public, particularly older persons.

Sociologic and psychologic in language and content, the report points out the evolution of interest in the aged, how the early studies were about biologic, psychologic, and economic aspects, and not until 1944 was there introduced a systematic research program for studying the social aspects of aging. The inadequacies of chronologic, physical, psychologic, and sociologic criteria of old age are outlined in argument for "combined functional criteria" of aging.

Problems specific to the personal adjustment of the aged, concepts from psychology and sociology useful in old age research, the need for resources on which the older person may draw when assistance in adjustment is required, age-culture patterns, and suggestions about research fields which are as yet untapped in the study of the aged in our society, all of these areas are considered as the authors define the background for their research report.

The data of the author's study include characteristics of later maturity (age distribution, educational level, family relationships, financial condition, physical state, attitudes) obtained from the 16th U. S. Census and from a sample of persons aged 60 or over, trends with age, and brief sketches of some of the old people studied illustrating happy and adequate adjustments as well as maladjustments to old age.

The pieces de resistance are the two Inventories, one of activities (20 items) and the other of attitudes (158 items). The authors objectively review the problems of measurement in these areas, reliability, criteria of adjustment, and validity of such criteria. The Appendixes include the Inventories and other material significant to the research report.

The readability of the text, factual data, critical examination of the authors' efforts, and suggestions for research in the personal adjustment of the aged combine to make the book a useful addition to the literature.

I. N. MENSH

RESOURCES FOR THE AGED IN BRITAIN

AGE IS OPPORTUNITY: A New Guide to Practical Work for the Welfare of Old People, published for the National Old People's Welfare Committee by the National Council of Social Service, Inc., 26 Bedford Square, London, W. C. 1., 1949, 118 page, paper bound, 2s6d.

This paper bound pamphlet, with the excellent photograph of a cheerful, well bearded, pipe-smoking British oldster on its cover, is without doubt a most welcome addition to the slowly growing volume of authentic literature on the subject of old age and old people.

The purpose of the booklet is that of a working guide for persons who wish to promote the welfare of old people in Great Britain through direct service or through indirect methods. However, it is a genuine tribute to the National Old People's Welfare Committee and its secretary, Miss Dorothea Ramsey, who have produced the booklet, that it succeeds in being much more than the source of factual information on the needs of older people and what is available in the way of volunteer visiting, domestic help, meal services, clubs, resources for occupational interests, housing both actual and proposed, residential homes, and a source of interpretation of what can be done at the national, county, and local levels of government through statutory and voluntary provisions which such guides usually are.

To this reviewer, it is nothing short of genius to have the contents of this little book comprehend within its covers an inclusive and specific manual on what there is in resources of all kinds and on how they may be most effectively used by the imaginative application of the very practical measures outlined, and beyond that, to have those same contents comprise one of the most human documents about old people as people which has been recently issued.

In the very simplicity of its language, in the directness of its statements of facts, even in its discussion and explanation of the pedestrian facts about legislation, there is conveyed an exceptionally keen and deep understanding of old people. Yet the manual loses none of its value as a working guide by this warmth of feeling and awareness of human needs which are reflected in every page.

The humaneness of the book, tempered as it is by recognition of the ordinary day to day facts which must so often determine how much can be accomplished, with the best will in the world, is something which is sensed throughout and suggests that here is reading which will be of profit. Hopefully, too, the quality of it will be emulated in similar guides and manuals for work in this country.

In conclusion, the comment might be made that if work with older people can actually be carried out in this spirit, then no longer need we think it idle to prophesy or to believe that indeed "age is opportunity."

O. A. RANDALL

TREATISE ON MENTAL ILLNESS

THE MENTALLY ILL IN AMERICA, A History of Their Care and Treatment from Colonial Times, Albert Deutsch, Columbia University Press, New York, 1949, 555 pages, $5.50.

Whatever comment the author's more recent writings may have provoked, the first edition of his The Mentally Ill in America awakened the most favorable criticism and achieved a well earned and merited success. Mr. Deutsch was fortunate in having the advice and criticism of the leaders in psychiatric administration, clinical experience, and education in this country. Under their supervision he had access to a bibliography, historical details, and special spheres of interest that might otherwise have escaped his research activities. He has thereby accumulated in condensed form a wealth of invaluable information that might in the future become inaccessible.

This book is unique in the annals of psychiatric literature. The author's approach has been that of the social historian, which has made him broad in his perspective. He has avoided what might have been the more isolated approach of the psychiatrist to this subject. The psychiatrist is interested largely in the interpersonal relationship that exists between himself and his patient and his clinical interests leave him little time or thought for the social, economic, or cultural problems arising in the care of the physically or the mentally ill.

Interests and reforms of this nature generally arise from intelligent, thoughtful, and dynamic members of the laity who have seen the necessity for the solving of such problems through personal observation and experience. Mr. Deutsch is aware of such problems. He brings his subject into relation with the social stream, the economic pressure, and the cultural pattern of the community, avoiding the limitations of any possible professional bias.

All of the merits of his work are preserved in the second edition. The history of the care and treatment of the mentally ill is advancing so rapidly and is becoming such a complicated and complex subject that a new edition of the author's book was imperative. Most of these advances are recorded in this new edition published twelve years after the first.

This second edition follows the same general trend of the first edition. In such an encyclopaedic treatise, time and space forbid little more than an enumeration of the chapter headings with brief mention of the significant factors of their content.

The opening chapter, Prophets, Demons and Witches, reveals how "Before medicine there was magic." The author gives a detailed account of how "From time immemorial, the confounding of mental illness with demonical possession has existed." He supplies the necessary historical background, quoting first from the Bible, then furnishing evidence of this belief in the minds of the Egyptians and in the literature of the Greeks, at the same time giving the latter credit for some of our modern beliefs.

The revival of classical learning modified the grotesque and imaginative theories and procedures of the middle ages in a more humane direction. During the medieval period the mentally ill found the most understanding in therapy on the part of the Moslems, who are presumed to have been the first to erect special institutions for the mentally ill. The first in Europe of which there is indisputable record was built at Valencia, Spain, in 1408.

The second chapter, Colonial America: The Old World Heritage, starts the development of the theme indicated in the title. It further discusses superstitions and old world traditions the colonists brought to this country and records the tragic fate of those accused of witchcraft.

The next chapter, Colonial Provision for the Mentally Ill: Punishment, Repression and Indifference, states that not until 1752 was the first general hospital in this country established and that the first asylum for the exclusive

reception of the insane was delayed two decades later. Incarceration in jail was the common solution for the violent, especially if poor. "As for the non-violent dependents, they were ordinarily classified and treated, not as mentally ill, but simply as paupers, one yardstick ordinarily being used for all pauper classes under the poor laws."

Rational Humanitarianism: The Beginnings of Reform records the influence of the humanitarian movement of the eighteenth century. The political and social revolutions in America and France (1776 and 1789) and the influence of Thomas Paine, Benjamin Franklin, and especially the Quakers led to experiments in social welfare that extended to the mentally ill.

They were admitted to the Pennsylvania Hospital (general) when it was completed in 1756, but consigned to the cellar where their scalps were shaved and blistered. They were bled and purged and they were chained by the wrist or the ankle to the wall. Although their condition in outward appearance differed but little from the insane in prisons, they did receive, severe as it may seem today, some medical attention. Virginia erected the first American asylum exclusively for the mentally ill and opened it at Williamburg in 1773.

An entire chapter is devoted to Benjamin Rush—the Father of American Psychiatry. Rush (1745-1813) is presented not only as a psychiatrist but as one of the influential public spirited men of his time, dynamic, versatile, and articulate. A great physician, he was the first American teacher of psychiatry and author of the first general treatise in this country on the subject, Medical Inquiries and Observations upon the Diseases of the Mind (1812). While in the therapy of the mentally ill he accepted without question the necessity of coercion by mechanical restraint and of certain forms of corporal punishment and "recommended the total deprivation of food in some cases of insanity," he did advocate proper segregation of patients, separation of the sexes, the introduction of labor, exercise, and amusements, the hiring of intelligent men and women to attend the different sexes, the rigid exclusion of disturbing relatives, and furnishing the cells of pay patients with feather beds and mattresses.

The Rise of Moral Treatment is a chapter which shows how the humanitarian methods of Pinel and the experience gained from the tranquil environment of The Retreat at York under the intelligent direction of Tuke were exerting a transatlantic influence. We learn of the opening and early history of the institutions that are renowed today for the care and treatment of the mentally ill in the United States.

Functioning first as asylums or retreats, they are now known as the New York Hospital-Westchester Division, formerly Bloomingdale (1791), The Friends Hospital (1817), The McLean Hospital (1818), and the Institute of Living—The Neuro-Psychiatric Institute of the Hartford Retreat (1824). The dates refer to the opening of these institutions for patients, not their founding.

The chapter, Retrogession: Over the Hill to the Poorhouse, covers approximately the second quarter of the nineteenth century. Social consciousness was awakened to the then overwhelming problem of pauperism augmented by the indigent insane and defectives. Public officials, alarmed at the cost of building asylums, were responsible for the passing on of the indigent and irresponsible, irrespective of their mental condition, from town to town or dumped these in the dead of the night on adjacent communities. Often they were auctioned off to individuals or families who would undertake to keep them sometimes for as low as twenty-five cents per week.

Poorhouses multiplied rapidly during the 1820's to meet this condition, but they were a cure worse than the disease. They were erected at the least possible cost, mismanaged, inadequately maintained, and they housed indiscriminately the poor, the defective, and the insane of all ages.

The Cult of Curability and the Rise of State Institutions deals with the period around 1850. Social pressure had replaced the poorhouse with the state institution. The latter to justify

its existence endeavored to publish optimistic reports and positive accomplishments. As a reaction to the former pessimistic attitude toward the curability of mental disease, now there was an overcompensatory reaction through the use of unscientific statistics.

Various institutions both state and private endeavored to out-rival each other in their reported percentages of cures. This led Dr. William M. Awl of the Ohio State Lunatic Hospital at Columbus to achieve the ultimate in his statistical report (1843): "Per cent of recoveries on all recent cases discharged the present year, 100." It should be noted the ratios are based on discharged cases and not on admissions. Nevertheless, this record gained for Dr. Awl the pseudonym of Dr. Cure-Awl. It was really not until 1887 when Dr. Pliney Earl after years of careful research published The Curability of Insanity that prognostic optimism reached consistent proportions.

In this chapter, page 133 in the second edition, the author revises the figures on the recovery rate of patients admitted to state mental hospitals reported by the United States Bureau of the Census, 1942, which were reported from the same source in the first edition for 1931 and 1932, showing a slight improvement in the expected recovery rate.

An entire chapter is also justifiably given to Dorothea Lynde Dix: Militant Crusader. The author presents an informative account of her successive achievements. She travelled not only throughout the United States but also to Canada, Great Britain, and the European Continent in her zeal to help the mentally ill. She is reported to have been responsible during her life (1802-1887) for the founding or enlarging of 32 mental hospitals in the United States and abroad. She coined the expression "wards of the nation," which was a brand-new concept of government responsibility for the dependent mentally ill. Later she played an important part in the founding of the Government Hospital for the Insane at Washington, D. C. Although she often awakened resentment with her dynamic methods, her contemporary, Charles H. Nicholas of Bloomingdale Hospital appraised her as "the most useful and distinguished woman America has yet produced."

Mid-Century Psychiatrists is a chapter that will be of profound interest to all institutional psychiatrists. It contains concise but informative biographies of The Original Thirteen, that outstanding group of medical superintendents of mental hospitals who met in Philadelphia in 1844 and formed the Association of Medical Superintendents of American Institutions for the Insane, which developed into the present American Psychiatric Association.

In 1845, William Griesinger, only twenty-eight, published the first modern textbook, Die Pathologie und Therapie der psychischen Krankheiten, which placed psychiatry on a scientific footing.

A comparatively shorter chapter, Conflict of Theories: Restraint or Non-restraint?, presents these conflicting theories, records their historical development, and indicates how modern methods and therapies have virtually eliminated mechanical restraints to the point were the nonrestraint system is written into law on the statute books of several states, notably Massachusetts and New York.

The Trend Toward State Care discusses the economic and social factors that led to the establishing of state hospital and state care. It also presents the advantages of "the segregate or cottage plan over the old congregate system," and indicates how "the cottage system has found no application *in practice* commensurate with its acceptance as an institutional ideal in *theory*" due mainly to the failure of state legislatures to appropriate sufficient funds to build modern mental hospitals and the general unwillingness to abandon outworn institutions based on the congregate plan.

The subsequent chapter, State Care: Exodus from the Poorhouse, traces further the development and problems of state hospitalization with its advantages over county care. New York finally in 1890 after long years of debate passed the State Care Act, which was a triumph

of social legislation and set an example for other states to follow.

Psychiatry Emerges from Isolation deals with how psychiatry has tried to belie the epithet of the late Thomas W. Salmon, "the Cinderella of medicine." It has emerged from its cloistered institutional walls, revolted against simple custodial care, established medical research on a scientific plane, instituted out-patient, short term in-patient clinics, and psychopathic hospitals, given attention to social service, and also considered after-care.

As the title, The Mental Hygiene Movement and Its Founder, would imply, this chapter treats of the foundation of the Mental Hygiene Movement in this country under the dynamic influence of Clifford W. Beers and its subsequent development. No other movement in social history has been more intimately bound up from its incipiency with the personality of any one man. It occurred at the propitious moment of the beginning of organized preventative medicine. The story of Beers' mental illness, of his capitalizing upon it by writing his autobiography, A Mind That Found Itself (1908), and of his subsequent achievements are well told.

There are specific subheadings in this chapter, Mental Hygiene and Social Work, Mental Hygiene and the Child Guidance Movement, Mental Hygiene and Prison Clinics, Mental Hygiene in Industry, and Organizational Growth of Mental Hygiene, which are self-explanatory.

The second edition brings this chapter up-to-date. On page 326 Mr. Deutsch points out, "Unfortunately, there has been regression as well as progress in the field of correctional psychiatry." He records the resignation of Dr. Ralph S. Banay in 1942 as Chief of the Sing Sing Classification Clinic because of lack of funds and personnel to perform even a minimum psychiatric service. The author also reports the death of Mr. Beers July 9, 1943.

The next two chapters, Historical Backgrounds of Mental Defect and Changing Concepts in Mental Defect, deal with the mentally defective rather than the mentally ill per se. The mentally defective are those whose defect is chiefly in the intellectual component of their personality make-up. The etiologic factors are present at birth or shortly after; heredity, birth trauma, or infections are the usual causes. The mentally ill are those who have generally been adequate for a time and then have displayed disordered behavior. While intellectually adequate, their illnesses are usually functional in character and lie within the emotional or instinctive components of their personality.

Of course the mentally defective may have some emotional or instinctive difficulties superimposed upon some obvious or subtle organic or intellectual defect and the mentally ill may have some organic pathologic condition, but in the main the distinctions are as stated. The author discusses previous and contemporary views of mental defect, their social implications, and modern facilities for diagnosis and treatment.

Under Changing Concepts he gives attention to Critique of the Mental test, Changing Criteria of Mental Defect, Mendelianism and Mental Defective Pedigrees, Segregation, Sterilization, and Marriage Laws. He should be commended for pointing out the inadequacies and inconsistences of the last three procedures. Under social control be advocates: (1) Early identification and registration of the mentally deficient; (2) Special classes: differentiated education; (3) Mental hygiene clinics; (4) Institutional care and treatment; (5) Colony systems; (6) Parole; (7) Boarding out.

In the present edition the statistics on operations for sterilization have been revised to January 1, 1946, and recent changes in the state laws are also noted on pages 371-372. There is a revision of dates on sterilization in Nazi Germany on page 376. The United States Census Bureau figures for mental defective patients and epileptics in institutions are also revised and the nature of these institutions are more carefully differentiated in the light of recent information in this edition on pages 380 and 384.

Another chapter, Insanity and the Criminal Law, should be read by all jurists and all

psychiatrists called upon to testify in a criminal court. The criteria for determining criminal responsibility are historically reviewed and the legal tests for which the noted M'Naghten's Case (1843) set a precedent are cited. The author discusses in separate paragraphs Insane and Criminal Responsibility, Psychiatric Expert Testimony, The Hypothetical Question, Limited Responsibility and Mitigation of Punishment, Mental Examination of Defendents, "Present Insanity" and the Law, Disposition of the Criminal Insane, Place of Confinement, Release after Recovery, Habeas Corpus, and Suggested Reforms.

Our Commitment Laws is another must chapter for all jurists and psychiatrists as well. It indicates there is still much to be desired in most of the state laws. Unfortunately commitment by court following a trail by jury still exists in many states leading to the mentally ill person being exposed to the public view. Mr. Deutsch describes in order the steps generally taken in committing the mentally ill: (1) Petition; (2) Notice; (3) Certificate; (4) (5) Commitment order; (6) Transportation. He also discusses Voluntary and Temporary Commitment, Discharge and Parole, and Recommendations.

Laws change more rapidly than editions of their contents are forthcoming. Consequently, the author's statement on page 440, "Of the five principle methods for commitment authorized by the Mental Hygiene Law of New York, four are non-judicial" is subject to correction.

The author unfortunately, in what might otherwise have been a most valuable and informative chapter, confuses commitment and admission to a mental hospital. In many states, including New York, patients may be admitted to mental hospitals on a voluntary status or in New York State on one physician's certificate "when the patient is incapable of making a voluntary application, but does not object to hospital treatment." In New York State he also may be admitted on a certificate of a health officer or on an emergency admission. All of these procedures are without any court order. The patients are listed as on voluntary or certified status and not as committed. In New York State the term commitment is no longer used, but certification is substituted even in case of a court order. Patients are certified but not committed to mental hospitals in New York State. Recently the time element has also been altered.

Consequently on page 440 the sentence, "These methods are (1) admission on voluntary application, under which the patient may be detained not more than ten days after he gives written notice of his desire to leave; (2) admission on petition of relative or friend and certificate of one physician, valid for a period not exceeding thirty days after notice, etc.; (3) admission upon request of a health officer, valid for thirty days only; (4) emergency admission for a period not exceeding ten days; (5) regular court commitment" should be amended to read: These methods are (1) admission on voluntary application, under which the patient may be detained not more than sixty days after which he may give fifteen days written notice of his desire to leave; (2) admission on petition of relative or friend, and certificate of one physician, valid for a period not exceeding sixty days after notice, etc.; (3) admission on request of a health officer, valid for sixty days only; (4) emergency admission for a period not exceeding ten days; (5) regular court certification.

It should also be noted that in New York State the word insane has been taken out of the state laws and supplemented by mentally ill. The certified are not considered mentally incompetent unless they are declared so by court action entirely separate from any certification procedure, a fact of which even some members of the legal profession appear to be in ignorance.

The new edition, page 439, mentions that the mandatory jury trial for insanity was finally abolished in the District of Columbia in 1938.

Chapter XX, Modern Trends in Institutional Care and Treatment, has been rewritten in the new edition and brought up-to-date, pointing out the gradual development for "custodial to

the curative ideal." It stresses the desirable changes in institutional construction and personnel, the more improved institutional techniques of psychotherapy, occupational therapy, hydrotherapy, and the impressive arguments in favor of family care. It includes a ten-point program of minimum standards for psychiatric hospitals approved by the American Psychiatric Association and concludes with an informative section, Mental Hospital Statistics.

Mr. Deutsch is dealing with a dramatic subject. His style is likewise dramatic. He awakens interest, holds one's attention, and in the main accurately evaluates the past and present advances and limitations of the care and treatment of the mentally ill in America, although after his earlier chapters he treats of such care and treatment almost exclusively in the United States rather than in America as a whole. Canada is mentioned, but there is nothing about Mexico or South America. It is in this twentieth chapter that the dramatic quality of his writing arouses suspicion of being influenced more by feeling than fact. It savors of hyperbole.

When on Page 449, the statement "In some of the wards there were scenes that revealed the horrors of the Nazi concentration camps" appears, even the Editorial Committee feels constrained to append a foot-note interpreting this as "figurative language rather than a literal comparison." The author continues for three paragraphs to describe conditions somewhat comparable to the statement above and defends himself likewise in a foot-note to the effect that the statements "are not based exclusively or mainly on his eye witness observation, but are in each case supported by documentary evidence and/or the supporting statements of the institutions."

The reviewer does not wish even by inference to minimize the facts, but he does wish that some writer would give due credit to the nurses and attendents who give years of faithful service in somewhat similar environments without becoming discouraged or disillusioned and also point out how such environmental atmospheres could be improved by better trained and paid personnel, possible only through legislative appropriations that reflect the attitude of the taxpayer. When relatives are quick to criticize they should reflect they could not put up with the conduct of these patients in their homes, are loath to visit hospitals where it exists, and generally avoid rather than face such issues.

The second edition contains an entirely new chapter, Psychiatry in World War II. It covers adequately all phases of the subject as the special headings indicate: Home Front Morale, Psychiatry and Selective Service, Psychiatry in Armed Forces, Psychiatry in the Merchant Marine, Veteran Rehabilitation, and Civilian Lessons from War Psychiatry.

The last chapter, XXII, Towards Mental Hygiene is one of the most concise and informative descriptive reviews of the various schools in present-day psychiatric practice and theory. It is so replete with informative detail that it would take a separate review to do justice to its temperate and balanced attitude, but an enumeration of the revisions of this chapter in the second edition will give some appreciation of its scope.

On pages 491-492 new clinical investigations are added on the use of psychoanalyses in schizophrenia. Below on the latter page the greater interest and apparent need for psychoanalysis is reflected in the statement "fees in private average about $10. to $15. per hour, with three to five sessions weekly," replacing "fees in private practice average from $15. to $25. an hour, and a minimum of five hours a week is usually required" in the first edition.

Page 493 contains two new paragraphs on psychosomatic medicine, a subject not mentioned in the original edition. Pages 497-502 contains revised data on the use of drugs and shock therapy and a new paragraph on neurosurgery. Hoskins lectures on The Biology of Schizophrenia (1946) are commented upon on page 503. Pages 505-508 record a needed revision of the figures on the rate of recovery and the extent of mental disorder and are followed by a new and more up-to-date discussion of "the effect of the Depression Decade, 1929-

1939, on the mental health of the American people."

Pages 512-514 contain new data on the passage and main provisions of the National Mental Health Act by Congress in 1946 and mentions the creation on May 29, 1946, of the Group for the Advancement of Psychiatry (GAP). A portion of Dr. G. Broch Chrisholm's challenging address to his fellow psychiatrists, October 22, 1945, is quoted on page 516, while an excerpt from a more remote essay of Frederick H. Allen on page 496 of the first edition is omitted. The chapter ends pages 518-519 with some of the goals listed in the charter of the United States World Health Organization (WHO).

No critical attitude should deter the interest of any reader in this authentic history of the care and treatment of the mentally ill in America from colonial times to the present. Any adverse comment or suggestions for correction of technical errors are matters that will doubtless be corrected in subsequent editions. The foot-note at the bottom of page 2 should be amended to read pages 520 to 537 instead of pages 497 to 514.

This book should be a vade mecum for the mental hospital clinician as well as the administrator. It may be referred to with confidence by any writer or speaker on practically any phase of mental hygiene or adminsitrative psychiatry. It may also be recommended with safety to the medical profession as a whole and the laity as well. It should serve as a textbook for the medical student taking lectures in psychiatry. No one seeking to become a diplomat of the American Board of Psychiatry and Neurology can afford to ignore it. Every psychiatrist should have it on his library shelf among such classics as Freud's The Interpretation of Dreams, MacCurdy's The Psychology of Emotion, One Hundred Years of American Psychiatry, and The Commonsense Psychiatry of Dr. Adolf Meyer.

E. B. ALLEN

BOOKS RECEIVED

Books received since July 1, 1949, are acknowledged in the following list. Insofar as space and time permit, some will be selected for review in a later issue, but it is unlikely that all will be reviewed.

Blakiston's New Gould Medical Dictionary, The Blakiston Company, Philadelphia, 1294 pages, 252 illustrations, 129 in color, textbook edition, $8.50, thin paper edition, $10.75, deluxe edition, $13.50.

Brain Tumors and the Care of Neurosurgical Patients, by Ernest B. Sachs, C. V. Mosby Company, St. Louis, 552 pages, $15.00.

Fit Surroundings, by Robert H. Kirkwood, Department of Public Welfare of Virginia, Richmond, 1948, 174 pages, paper bound, a limited number available for free distribution.

Foods for Health as We Grow Older, Nutrition Service, Community Service Society, New York, 1949, 40 page pamphlet, 25¢ a single copy, 20¢ each plus postage in lots of 100 or more.

Home Care, Origin, Organization and Present Status of the Extra-Mural Program of Montefiore Hospital, Montefiore Hospital, New York, 1949, 56 pages, paper bound.

Hospitalization of the People of Two Counties, a Study of the Experiment in Hillsdale and Branch Counties, Michigan, 1940-1945, Bureau of Public Health Economics, Research Series No. 6, School of Public Health, University of Michigan, Ann Arbor, 1949, 91 pages, paper bound.

Length of Life, by L. I. Dublin, A. J. Lotka, and M. Spiegelman, The Ronald Press Co., New York, 1949, 379 pages, $7.00.

Medical Needs of the Aging Population, Conference for the Aged, Social Planning Council of St. Louis and St. Louis County, 1949, 15 mimeographed pages.

Physiology in Diseases of the Heart and Lungs, Harvard University Press, Cambridge, Massachusetts, 1949, 368 pages, $5.00.

The Plum Tree, by Mary Ellen Chase, The Macmillan Company, New York, 1949, 98 pages, $2.00.

Religion and Old Age, A Study of the Possible Influences of Religious Adherence on Adjustment, by Eva S. Oles, 1949, 53 page typewritten thesis, Department of Psychology, Bucknell University, Lewisburg, Pennsylvania.

INDEX TO CURRENT PERIODICAL LITERATURE

It is difficult to cover all journals and list all papers concerned with aging and the aged. Authors and publishers are requested to call attention to publications or send reprints.—Editor.

AGED, CARE OF—The Care of Old Age in the Home. J. H. Sheldon. *Medical Practitioner, 219:* 398-400, 1948. Abstract in *Psychological Abstracts, 23:* 461, 1949.

ALCOHOLISM—Endocrine Treatment of Alcoholism. J. W. Tintera and H. W. Lovell. *Geriatrics, 4:* 274-280, 1949.

ALBERT, A. D., JR.—Before Retiring, Stop, Look, Listen! *American Home, 42:* 10, June, 1949.

ALBERT, S.—and C. P. Leblond. Age Changes Revealed by Carbonyl Reagents in Tissue Sections. *Journal of Anatomy, 83:* 183-194, 1949.

ALLING, E. T.—Trends in Recipient Rates for General Assistance. *Social Security Bulletin, 12:* 9-11, June, 1949.

ANDREWS, G. S.—Latent Carcinoma of the Prostate. *Journal of Clinical Pathology, 2:* 197-208, 1949.

ANESTHESIA—Anesthesia and Surgery in Patients of Advanced Age. P. H. Lorhan. *Current Researches in Anesthesia and Analgesia, 28:* 190-202, 1949.

ANGELINE TERESA (MOTHER)—At Sixty-Five; New Roots in Life's Garden. *National Conference of Catholic Charities,* 45-54, 1948.

ANONYMOUS—Age and Mental Alertness. *Hygeia, 27:* 446, 1949.

Age Wins a Round in Whitney, Texas. *Life 27:* 28-29, Aug. 15, 1949.

Battle for Pensions. *Life, 27:* 41-45, Oct. 17, 1949.

Bigger and Better Pensions? *United States News and World Report, 27:* 29-30, Sept. 30, 1949.

A Century of Progress in Longevity. *Statistical Bulletin,* Metropolitan Life Insurance Co., *30:* no. 11, 1-3, 1949.

Chicago's Oldsters Arrange Camp Vacation. *Public Aid in Illinois, 16:* 11, 1949.

Churches' Part in Old Peoples' Welfare. *Bulletin of the Central Churches Group,* London, April, 1947, 8 pages.

Elderly Sick. *British Medical Journal:* no. 4622, 324, 1949.

Employment of Elderly Persons. *Lancet, 257:* 469-470, 1949.

Federation Employment Service. Experience, Loyalty, Skill—Come with *Age;* Report of a Campaign to Stimulate Job Opportunities for Middle-Aged and Older Workers. *Occupations, 27:* 301-306, 1949. Abstracted in *Psychological Abstracts, 23:* 461, 1949.

Illinois' Oldest Old Age Pensioner. *Public Aid in Illinois, 16:* 11, 1949.

Institute on Aging (2d), July 20-21, 1949. *School and Society, 70:* 26, July, 1949.

Is There a Key to Long Life? *Science Digest, 25:* 74-75, June, 1949.

Japanese to Become Younger. *Science Digest, 26:* 62, Nov., 1949.

More Old Folks to Support. *United States News and World Report, 27:* 15-17, Oct. 14, 1949.

Newly Established Laboratory. *American Journal of Sociology, 55:* 97-98, July, 1949.

Not So Withered with Age; Studies of Nonagenarians and Centenarians. *Newsweek, 34:* 42-43, July 11, 1949.

Nothing's Too Good for Grandpa. *Time, 54:* 16-17, Sept. 5, 1949.

Old Age (letter to the Editor). *British Medical Journal:* no. 4631, 817; no. 4632, 872, 1949.

Old Men, Tired and Sick, Guide Postwar World in Atomic Age. *United States News and World Report, 27:* 34-35, Sept. 23, 1949.

Old People and the Community. *British Medical Journal:* no. 4622, 330, 1949.

Older Workers in Rochester, New York. New York (State) Department of Labor, Division of Placement and Unemployment Insurance. *Labor Market:* 38-42, July, 1949.

A Problem of Age—*Personal. Survey, 85:* 534, 1949.

Ready to Retire? *Business Week,* 124. April 30, 1949.

Your Pension Prospects: Going Up. *United States News and World Report, 27:* 39-40, Aug. 26, 1949.

ANTIRETICULAR CYTOTOXIC SERUM—Influence of Anti-Organ Sera upon Metabolic Processes; the Effect of Antireticulo-endothelial Immune Sera upon the Dehydrogenase Systems. D. MacDonald. *Texas Reports on Biology and Medicine, 7:* 332-335, 1949.

ANTMAN, J.—Older Parent-Adult Child Counseling. *Jewish Social Service Quarterly, 25:* 334-340, 1949. Abstracted in *Psychological Abstracts, 23:* 525, 1949.

ARTERIOSCLEROSIS — Priscoline and Arteriosclerotic Peripheral Vascular Disease. M. P. Rogers. *Geriatrics, 4:* 315-319, 1949.

ASHBY, E.—Leaf Shape, Study of Ageing in Plants. *Scientific American, 181:* 22-24, Oct., 1949.

ATHEROSCLEROSIS—Effect of Choline on the Prevention of Experimental Atherosclerosis. L. M. Morrison. *Geriatrics, 4:* 236-238, 1949.

AUSTRIA, G. F.—(See Sison, A. G.)

BALL, R. M.—What Contribution Rate for Old-Age and Survivors Insurance? *Social Security Bulletin, 12:* 3-9, July, 1949.

BARCELONA, J. M.—The Electrocardiogram Among Professionals Above the Age of 50 Without Apparent Cardiac Disease. *Acta medica philippina, 5:* 47-57, April-June, 1949.

BASYLEWYCZ, I.—Hormonorgane und Alter. *Zeitschrift für Vitamin- Hormon- und Fermentforschung, 2:* 265-287, 1949.

BAXTER, J. S.—(See Yoffey, J. M.)

BENJAMIN, H.—Outline of a Method to Estimate the Biological Age with Special Reference to the Role of the Sexual Functions. *International Journal of Sex* (Bombay), *3:* 34-37, Aug., 1949.

BICKERTON, F. D.—Employment of Elderly Persons. *Lancet, 257:* 579, 1949.

BLAKE, E. M.—The Etiology and Nonsurgical Treatment of Cataract. *North Carolina Medical Journal, 10:* 309-312, 1949.

BLOOM, M. T.—Retirement Doesn't Have to be Exile. *Rotarian, 75:* 15, Sept., 1949.

BOICE, M. L.—Color Vision and Age. *American Journal of Psychology, 61:* 520-526, Oct., 1948.

BOTANY—Leaf Shape, Study of Ageing in Plants. E. Ashby. *Scientific American, 181:* 22-24, Oct., 1949.

BRAIN—Acid Phosphatase in the Senile Brain. H. Josephy. *Archives of Neurology and Psychiatry, 61:* 164-169, 1949.

Concentration of Lipids in the Brain of Infants and Adults. A. C. Johnson, A. R. McNabb, and R. J. Rossiter. *Biochemical Journal, 44:* 494-497, 1949.

Influence of the Age Factor upon the Brain Lesions Produced by Prolonged Overdosage with Desoxycorticosterone Acetate. P. S. Timiras, C. Faribault, and H. Selye. *Geriatrics, 4:* 225-235, 1949.

Influence of Anti-Organ Sera upon Metabolic Processes; Influence of Chick Anti-Brain Serum upon Oxygen Consumption of Chick-Brain Homogenates. W. W. Nowinski. *Texas Reports of Biology and Medicine, 7:* 230-236, 1949.

BRONSON, D. C.—Security or Delusion? Unsound Pension Plans Dry up Benefit Sources. *Fiduciary Publications, Inc.* (New York), 6 pages, 1949.

CANCER—Cancer as a Phenomenon of Rejuvenescence. J. L. De Courcy. *Geriatrics, 4:* 239-241, 1949.

Malignancy of Cancer at Different Ages; a Histological Study. J. C. Lees and W. W. Park. *British Journal of Cancer, 3:* 186-197, 1949.

CARLING, E. R.—Problems of Old Age. *British Scientific News, 2:* 194-196, 1949.

CARTER, J. B.—(See Traut, E. F.)

CAVE, M.—Stray Notes at Seventy. *Good Housekeeping, 129:* 113, Oct., 1949.

CHRONIC ILLNESS—Aging and Chronic Illness (editorial). E. J. Stieglitz. *Geriatrics, 4:* 320-322, 1949.

Chronic Sick under New Management; Experiences in Starting a Geriatric Unit. A. N. Exton-Smith and G. S. Crockett. *Lancet, 1:* 1016-1018, 1949.

Problems of Aging and Chronic Sickness. A. P. Thomson. *British Medical Journal:* no. 4622, 300-305, 1949.

CLARK, LE MON—Sex Life of the Middle Aged. *Marriage and Family Living, 11:* 58-60, 1949. *Abstracted in Psychological Abstracts, 23:* 595, 1949.

CLIMACTERIC—Treatment of Menopause by Estradiol Pellet Implantation. M. V. Okie. *New York State Journal of Medicine, 49:* 1175, 1949.

CLOW, H. E.—Address to the American Geriatrics Society. *Geriatrics, 4:* 271-273, 1949.

COLLINS, D. D.—The Grave Prognosis of Appendicitis in the Aged. *Annals of Western Medicine and Surgery, 2:* 13 pages, 1949.

COPLAND, S. M.—Surgery of the Aged. *New Orleans Medical and Surgical Journal, 101:* 593-597, 1949.

COSIN, L.—(See Jungmann, H. J.)

COWIE, A. T.—The Influence of Age and Sex on the Life Span of Adrenalectomized Rats. *Journal of Endocrinology, 6:* 94-98, 1949.

CRAMPTON, C. W.—Nutrition, Geriatrics, and the Physician. *Nutrition Reviews, 7:* 289-290, 1949.

CROCKETT, G. S.—and A. N. Exton-Smith. The Employment of Elderly Persons (letter to the editor). *Lancet, 257:* 627, 1949.

CROCKETT, G. S.—(See Exton-Smith, A. N.)

DECOURCY, J. L.—Cancer as a Phenomenon of Rejuvenescence. *Geriatrics, 4:* 239-241, 1949.

DENKO, C. W.—and W. E. Grundy. Minimum Tryptophane Requirement and Urinary Excretion of Tryptophane by Normal Adults. *Journal of Laboratory and Clinical Medicine, 34:* 839-843, 1949.

DOMANIG, E.—Struma und Alter. *Wiener Klinische Wochenschrift, 4:* 568-569, 1949.

DRESCHER, E. P.—and J. W. Henderson. Senile Hyaline Scleral Plaques; Report of Three Cases. *Proceedings of the Mayo Clinic, 24:* 334-336, 1949.

DUGAST-ROUILLÉ, M.—Les Signes de la Longévité. *Psyché, 3:* 1102-1107, 1948. Abstracted in *Psychological Abstracts, 23:* 595, 1949.

EDWARDS, W. H.—German Age-Problems. *Spectator, 182:* 504-505, 1949.

EMPLOYMENT—The Ageing Worker. J. Fleetwood. *Progress* (Ireland), *1:* 7, 1949.

Employment of Elderly Persons. Anon. *Lancet, 257:* 469-470, 1949.

Employment of Elderly Persons. F. D. Bickerton. *Lancet, 257:* 579, 1949.

Employment of Elderly Persons (letter to the Editor). G. S. Crockett and A. N. Exton-Smith. *Lancet, 257:* 627, 1949.

Job Sleuths for the Middle-Aged. E. Michael. *Coronet, 26:* 166-168, Oct., 1949.

Older Workers in Rochester, New York. Anon. New York (State) Department of Labor, Division of Placement and Unemployment Insurance. *Labor Market,* 38-42, July, 1949.

Return to Work of Elderly Male Patients. J. Pemberton. *British Medical Journal:* no. 4622, 306-308, 1949.

Summary of Physical Findings of Employees Over Sixty Years of Age. G. A. Paul. *Industrial Medicine and Surgery, 18:* 360-364, 1949.

ENGLISH, O. S.—A Brighter Future for Older People. *Geriatrics, 4:* 217-224, 1949.

ENZYMES—Acid Phosphatase in the Senile Brain. H. Josephy. *Archives of Neurology, 61:* 164-169, 1949.

ERSHOFF, B. A.—(See Templeton, H. A.)

EXERCISE—Exercise After 40? Forget It! P. J. Steincrohn. *Science Digest, 26:* 1-6, Nov., 1949.

FAHEY, R. J.—R. M. Kilfoyle and J. H. Shortell. Medical Considerations in the Care of Elderly Patients with Hip Fractures. *New England Journal of Medicine, 241:* 325, 329, 1949.

FARIBAULT, C.—(See Timiras, P. S.)

FETTER, F.—and T. G. Schnabel. Sickle-Cell Anemia in Patients Over Forty-Five. *Geriatrics, 4:* 309-314, 1949.

FISCHER, F. P.—Growth Curves and the Senescence of the Eye. Abstracted in *Ophthalmologica, 117:* 379-380, 1949.

FLEETWOOD, J.—The Ageing Worker. *Progress* (Ireland), *1:* 7, 1949.

FOLSOM, M. B.—Money After Age 65. *Atlantic Monthly, 184:* 69-72, Aug., 1949.

FRACTURES—Medical Considerations in the Care of Elderly Patients with Hip Fractures. R. J. Fahey, R. M. Kilfoyle, and J. H. Shortell. *New England Journal of Medicine, 241:* 325-329, 1949.

FREEMAN, N. E.—F. H. Leeds, and R. E. Gardner. A Technique for Division and Suture of the Patent Ductus Arteriosus in the Older Age Group. *Surgery, 26:* 103-108, 1949.

FRIEDFELD, L.—Heat Reaction States in the Aged. *Geriatrics, 4:* 211-216, 1949.

GARDNER, R. E.—(See Freeman, N. E.)

GASTROENTEROLOGY—A Comparison of the Propulsive Motility of the Small Intestine in Adult Dogs and Pups. J. C. Stickney, E. J. Van Liere, and D. W. Northup. *American Journal of Physiology, 158:* 201-204, 1949.

Some Observations upon the Radiology of the Small Intestine in Old Age. H. J. Jungmann and L. Cosin. *British Journal of Radiology, 22:* 325-330, 1949.

GEOLOGY—Radioactivity and Time. P. M. Hurley. *Scientific American, 181:* 48-51, Aug., 1949.

GENETICS—The Production of Dominant Lethals with X-Rays in Aged Drosophila Melanogaster Sperm. O. Strømnaes. *Genetics, 34:* 462-474, 1949.

Sib-Sib Age of Onset Correlation Among Individuals Suffering from a Hereditary Syndrome Produced by More than One Gene. H. Harris and C. A. B. Smith. *Annals of Eugenics, 14:* 309-318, 1949.

GENERAL—Address to the American Geriatrics Society. H. E. Clow. *Geriatrics, 4:* 271-273, 1949.

After Hours; Too Old for Tennis Tournaments. Mr. Harper. *Harper's Magazine, 199:* 99-100, Oct., 1949.

Age Wins a Round in Whitney, Texas. Anon. *Life, 27:* 28-29, Aug. 15, 1949.

Aged Get Going in Chicago. H. G. Laue. *Public Aid in Illinois, 16:* 16-17, 1949.

Aging Man in the Modern World. F. Phillips. *Medical Journal of Australia, 2:* 249-251, 1949.

At Sixty-Five; New Roots in Life's Garden. Mother Angeline Teresa. *National Conference of Catholic Charities,* 45-54, 1948.

Are You Aging Successfully? (condensed from *New York Sales Executive*). G. Lawton. *Advertiser's Digest, 14:* 11-12, 1949.

Aufgaben und Bergrenzung der Altersforschung. A. L. Vischer. *Bulletin der Schweizerischen Akademie der Medizinischen Wissenschaften, 5:* fasc. 4, 290-301, 1949.

Brighter Future for Older People. O. S. English. *Geriatrics, 4:* 217-224, 1949.

Can We Be Made Young Again? C. W. Lieb. *Science Digest, 23:* 28-32, July, 1949.

Chicago's Oldsters Arrange Camp Vacations. Anon. *Public Aid in Illinois, 16:* 11. 1949.

Churches' Part in Old Peoples' Welfare. Anon. *Bulletin of the Churches Group* (London), April, 1947, 8 pages.

Definition and Quantitative Expression of Ageing. J. Mayer. *Growth, 13:* 97-101, June, 1949.

German Age-Problems. W. H. Edwards. *Spectator, 182*: 504-505, 1949.

Illinois' Oldest Old Age Pensioner. Anon. *Public Aid in Illinois, 16:* 11, 1949.

Is There a Key to Long Life? Anon. *Science Digest, 25:* 74-75, June, 1949.

Japanese to Become Younger. Anon. *Science Digest, 26:* 62, Nov., 1949.

Living with Your Children. L. B. Hohman. *Ladies Home Journal, 66:* 172, Sept., 1949.

Medical Significance of our Aging Population. F. D. Zeman. *Public Health Nursing, 41:* 381-384, 1949.

Money After Age 65. M. B. Folsom. *Atlantic Monthly, 184:* 69-72, Aug., 1949.

More Old Folks to Support. Anon. *United States News and World Report, 27:* 15-17, Oct. 14, 1949.

New Goals for Old Age (editorial). H. N. Kamin. *Geriatrics, 4:* 256-257, 1949.

Not So Withered with Age; Studies of Nonagenarians and Centenarians. Anon. *Newsweek, 34:* 42-43, July 11, 1949.

Nothing's Too Good for Grandpa. Anon. *Time, 54:* 16-17, Sept. 5, 1949.

Old Age (letter to the Editor). Anon. *British Medical Journal:* no. 4631, 817; no. 4632, 872, 1949.

Old Age. T. H. Howell, *Geriatrics, 4:* 281-292, 1949.

Old Age. T. G. Klumpp. *New York State Journal of Medicine, 49:* 1929-1933, 1949.

Old Age (letter to the Editor). J. R. Lund. *British Medical Journal:* no. 4630, 758, 1949.

Old Age. J. A. Wilson. *Connecticut Medical Journal, 13:* 531-533, 1949.

Old Age as a Social Problem. W. A. Sanderson. *Advancement of Science, 6:* 19, April, 1949.

Old Men, Tired and Sick, Guide Postwar World in Atomic Age. Anon. *United States News and World Report, 27:* 34-35, Sept., 23, 1949.

Old People and the Community. Anon. *British Medical Journal:* no. 4622 330, 1949.

Older People. R. K. McNickle. *Editorial Research Reports, 2:* 485-501, 1949

Out to Pasture. J. A. Michener. *Nation's Business, 37:* 32-33, April, 1949.

Plato's Philosophy of Old Age. J. J. Griffin. *Geriatrics, 4:* 242-255, 1949.

Problem of Old Age—*Personal.* Anon. *Survey, 85:* 534, 1949.

Problems of Old Age. E. R. Carling. *British Scientific News, 2:* 194-196, 1949.

Salute to John Dewey—"Going on 91." J. H. Randall, Jr. *Survey, 85:* 509-510, 1949.

So Old Nobody Wants You. W. M. Smith, Jr. *Journal of Home Economics, 41:* 308-310, 1949.

Some Economic Implications of an Ageing Population. B. E. Lewis. *Advancement of Science, 6:* 21, April, 1949.

Stray Notes at Seventy. M. Cave. *Good Housekeeping, 129:* 113, Oct., 1949.

We're Living with Our Children. E. Janewaz and E. Janewaz. *Ladies Home Journal, 66:* 165-170, Sept., 1949.

What to Do with 18 Million Aged? S. E. Harris. *New York Times Magazine,* 8, July 10, 1949. Discussion, 2, July 24, 1949.

Widows and the Perilous Years. Z. Popkin. *Harper's Magazine, 199:* no. 1192, 69-75, 1949.

Zur Frage nach dem Alter der Elemente. H. E. Suess. *Experientia, 5:* 278, 1949.

GERARD, R. W.—Life that Doesn't Run Down. *Science Digest, 26:* 57-59, Nov., 1949.

GERIATRICS—Elderly Sick. Anon. *British Medical Journal:* no. 4622, 324, 1949.

Geriatri, en ny gren av medisinen. P. Hanssen. *Tidsskrift for den norske laegeforening, 69:* 145-147, 1949.

New Skin Treatment for the Incontinent Patient, G. Nagamatsu, T. Johnson, and M. E. Silverstein. *Geriatrics, 4:* 293-302, 1949.

GLANDS—Histochemical Changes in the Suprarenal Gland of the Adult Male Rat. J. M. Yoffey and J. S. Baxter. *Journal of Anatomy, 83:* 89-98, April, 1949.

Latent Carcinoma of the Prostate. G. S. Andrews. *Journal of Clinical Pathology, 2:* 197-208, 1949.

Struma und Alter. E. Domanig. *Wiener Klinische Wochenschrift, 4:* 568-569, 1949.

GRIFFIN, J. J.—Plato's Philosophy of Old Age. *Geriatrics, 4:* 242-255, 1949.

GRUNDY, W. E.—(See Denko, C. W.)

GUMBINER, S. H.—(See Traut, E. F.)

HANKS, J. H.—Inorganic Aging of the Plasma Layer of Tissue Cultures. *Proceedings of the Society for Experimental Biology and Medicine, 71:* 313-315, 1949.

HANSSEN, P.—Geriatri, en ny gren av medisinen. *Tidsskrift for den norske laegeforening, 69:* 145-147, 1949.

HARPER, MR.—After Hours; Too Old for Tennis Tournaments. *Harper's Magazine, 199:* 99-100, Oct., 1949.

HARRIS, H.—and C. A. B. Smith. The Sib-Sib Age of Onset Correlation Among Individuals Suffering from a Hereditary Syndrome Produced by More Than One Gene. *Annals of Eugenics, 14:* 309-318, 1949.

HARRIS, S. E.—What to Do with 18 Million Aged? *New York Times Magazine:* 8, July 10, 1949. Discussion p. 2, July 24, 1949.

HAUSAMMANN, E.—Die Koronarsklerose im höheren Alter in ihrer Beziehung zur Koronarsklerose der Jugendlichen. *Cardiologia, 14:* 225-242, 1949.

HEART—Bacterial Endocarditis in the Elderly. E. F. Traut, J. B. Carter, and S. H. Gumbiner. *Geriatrics, 4:* 205-210, 1949.

Electrocardiogram Among Professionals Above the Age of 50 Without Apparent Cardiac Disease. J. M. Barcelona. *Acta medica philippina, 5:* 47-57, April-June, 1949.

Incidence of Valvular Heart Disease in People Over 50 and Penicillin Prophylaxis of Bacterial Endocarditis. P. Lichtman and A. M. Master. *New York State Journal of Medicine, 49:* 1693-1698, 1949.

Die Koronarsklerose im höheren Alter in ihrer Beziehung zur Koronarsklerose der Jugendlichen. E. Hausammann. *Cardiologia, 14:* 225-242, 1949.

Use of Digitalis Drugs in the Aged. A. Mueller-Deham. *Geriatrics, 4:* 303-308, 1949.

HEGSTED, D. M.—(See Trulson, M.)

HEMATOLOGY—Erythrocyte Age and Cholinesterase Activity. J. A. Pritchard. *American Journal of Physiology, 158:* 72-76, 1949.

Individual and Age Variation in Methemoglobin Formation and Reduction in Rabbit Erythrocytes. S. S. Spicer and H. Reynolds. *American Journal of Physiology, 195:* 46-47, 1949.

Sickle-Cell Anemia in Patients over Forty-Five. F. Fetter and T. G. Schnabel. *Geriatrics, 4:* 309-314, 1949.

HENCH, R. N.—(See Traut, E. F.)

HENDERSON, J. W.—(See Drescher, E. P.)

HISTOLOGY—Age Changes Revealed by Carbonyl Reagents in Tissue Sections. S. Albert and C. P. Leblond. *Journal of Anatomy, 88:* 183-194, 1949.

HOHMAN, L. B.—Living with Your Children. *Ladies Home Journal, 66:* 172, Sept., 1949.

HOMES—To the County Home to Die; Indiana's Allen County Institution. G. Schendel. *Collier's, 124:* 22-23, Oct. 8, 1949.

HORMONES—Hormonorgane und Alter. I. Basylewycz. *Zeitschrift für Vitamin-Hormon- und Fermentforschung, 2:* 265-287, 1949.

Outline of a Method to Estimate the Biological Age with Special Reference to the Role of the Sexual Functions. H. Benjamin. *International Journal of Sex* (Bombay), *3:* 34-37, Aug., 1949.

Role of Age in Estrogen-Induced Lymphoid Tumors of Mice. M. Silberberg and R. Silberberg. *Archives of Pathology, 47:* 340-349, 1949.

HORST, L. VAN DER—Psychopathology and the Concept of Humanity on Aging. *Confinia neurologica, 9:* 177-192, 1949.

HOWELL, T. H.—Chronic Rheumatic Disease in the Elderly. *Rheumatism, 5:* 82-85, 1949.

HOWELL, T. H.—Old Age. *Geriatrics, 4:* 281-292, 1949.

HURLEY, P. M.—Radioactivity and Time. *Scientific American, 181:* 38-51, Aug., 1949.

HYPERTENSION—Age, Body Weight and Blood Hypertensinogen. G. P. Rau. *American Journal of Physiology, 185:* 401-402, 1942.

INSURANCE—What Contribution Rate for Old-Age and Survivors Insurance? R. M. Ball. *Social Security Bulletin, 12:* 3-9, July, 1949.

JANEWAZ, E.—and E. Janewaz. We're Living with Our Children. *Ladies Home Journal, 66:* 165-170, Sept., 1949.

JANEWAZ, E.—(See Janewaz, E.)

JOHNSON, A. C.—A. R. McNabb, and R. J. Rossiter. Concentration of Lipids in the Brain of Infants and Adults. *Biochemical Journal, 44:* 494-497, 1949.

JOHNSON, T.—(See Nagamatsu, G.)

JOHNSON, W. M.—Adjustment to Age. *Medical Annals of the District of Columbia, 17:* 664-701, 1948. Abstracted in *Psychological Abstracts, 23:* 595, 1949.

JOSEPHY, H.—Acid Phosphatase in the Senile Brain. *Archives of Neurology and Psychiatry, 61:* 164-169, 1949.

JUNGMANN, H. J.—and L. Cosin. Some Observations upon the Radiology of the Small Intestine in Old Age. *British Journal of Radiology, 22:* 325-330, 1949.

KAMIN, H. N.—New Goals for Old Age (editorial). *Geriatrics, 4:* 256-257, 1949.

KILFOYLE, R. M.—(See Fahey, R. J.)

KLUMPP, T. G.—Old Age. *New York State Journal of Medicine, 49:* 1929-1933, 1949.

KRAMER, H. K.—Pensioning Your Employees. *Best's Insurance News, 50:* 71-72, Aug., 1949.

LAUE, H. G.—The Aged Get Going in Chicago. *Public Aid in Illinois, 16:* 16-17, 1949.

LAWTON, G.—Are You Aging Successfully? (condensed from *New Work Sales Executive*). *Advertiser's Digest, 14:* 11-12, 1949.

LEBLOND, C. P.—(See Albert, S.)

LEEDS, F. H.—(See Freeman, N. E.)

LEES, J. C.—and W. W. Park. The Malignancy of Cancer at Different Ages; a Histological Study. *British Journal of Cancer, 3:* 186-197, 1949.

LEHMAN, H. C.—Some Examples of Creative Achievement During Later Maturity and Old Age. *Journal of Social Psychology, 30:* 49-79, 1949.

LEWIS, B. E.—Some Economic Implications of an Ageing Population. *Advancement of Science, 6:* 21, April, 1949.

LICHTMAN, P.—and A. M. Master. The Incidence of Valvular Heart Disease in People Over 50 and Penicillin Prophylaxis of Bacterial Endocarditis. *New York State Journal of Medicine, 49:* 1693-1698, 1949.

LIEB, C. W.—Can We Be Made Young Again? *Science Digest, 23:* 28-32, July, 1949.

LIFE SPAN—The Influence of Age and Sex on the Life Span of Adrenalectomized Rats. A. T. Cowie. *Journal of Endocrinology, 6:* 94-98, 1949.

Influence of American Occupation on the Life Span of the Filipino and on the Incidence of Degenerative Diseases. A. G. Sison and G. F. Austria. *Acta medica philippina, 5:* 1-8, 1949.

LONGEVITY—A Century of Progress in Longevity. Anon. *Statistical Bulletin,* Metropolitan Life Insurance Co., *30:* no. 11, 1-3, 1949.

Concept of Action as a Measure of Living Phenomena. M. Ruderfer. *Science, 110:* 245-252, 1949.

Longevity of Tropical Rat Mites Kept without Food. J. A. Scott. *Journal of Parasitology, 35:* 434, 1949.

Les Signes de la Longévité. M. Dugast-Rouillé. *Psyché, 3:* 1102-1107, 1948. Abstracted in *Psychological Abstracts, 23:* 595, 1949.

LORHAN, P. H.—Anesthesia and Surgery in Patients of Advanced Age. *Current Researches in Anesthesia and Analgesia, 28:* 190-202, 1949.

LOVELL, H. W.—(See Tintera, J. W.)

LUND, J. R.—Old Age (letter to the Editor). *British Journal:* no. 4630, 758, 1949.

MALLISON, ROBERT—Valeur clinique de l'encéphalogramme dans les processes d'atrophie cérébrale pendant la période d'involution (Clinical Value of the Encephalogram in the Processes of Cerebral Atrophy during the Involution Period). *Archives internationales de neurologie, 67:* 205-206, 1948. Abstracted in *Psychological Abstracts, 23:* 486, 1949.

MASTER, A. M.—(See Lichtman, P.)

MAYER, J.—Definition and Quantitative Expression of Ageing. *Growth, 13:* 97-101, June, 1949.

MACDONALD, D.—Influence of Anti-Organ Sera upon Metabolic Processes; the Effect of Antireticulo-Endothelial Immune Sera upon the Dehydrogenase Systems. *Texas Reports on Biology and Medicine, 7:* 332-335, 1949.

MCNABB, A. R.—(See Johnson, A. C.)

MCNICKLE, R. K.—Older People. *Editorial Research Reports, 2:* 485-501, 1949.

MCWILLIAMS, C.—Pension Politics in California. *Nation, 169:* 320-322, Oct. 1, 1949.

MEETINGS—Institute on Aging (2d), July 20-21, 1949. Anon. *School and Society, 70:* 26, July 9, 1949.

MICHAEL, E.—Job Sleuths for the Middle-Aged. *Coronet, 26:* 166-168, Oct., 1949.

MICHENER, J. A.—Out to Pasture. *Nation's Business, 37:* 32-33, April, 1949.

MOISE, D.—(See Schiebel, H. M.)

MORRISON, L. M.—The Effect of Choline on the Prevention of Experimental Atherosclerosis. *Geriatrics, 4:* 236-238, 1949.

MORTALITY RATES—The Effect of the Change in Mortality Conditions in an Age Group on the Expectation of Life at Birth. C. C. Sekar. *Human Biology, 21:* 35-46, 1949.

MUELLER-DEHAM, A.—The Use of Digitalis Drugs in the Aged. *Geriatrics, 4:* 303-308, 1949.

MYERS, J. A.—Tuberculosis Among the Aged. *Bulletin of the Chicago Medical Society, 51:* 1071-1075, 1949.

NAGAMATSU, G.—T. Johnson, and M. E. Silverstein. A New Skin Treatment for the Incontinent Patient. *Geriatrics, 4:* 293-302, 1949.

NEUMANN, M. A.—Pick's Disease. *Journal of Neuropathology, 8:* 255-282, 1949.

NEUROLOGY—Paralisis General y Edad (Revisiones de Conjunto). J. Simarro Puiz and A. Riera Doménesh. *Revista Clínica Española, 33:* 311-317, 1949.

Loss of Consciousness and Convulsions in Middle-Aged Patients. P. I. Yakovlev. *Connecticut Medical Journal, 13:* 521-527, 1949.

Pick's Disease. M. A. Neumann. *Journal of Neuropathology, 8:* 255-282, 1949.

Valeur clinique de l'encéphalogramme dans les processes d'atrophie cerebrale pendant la période d'involution. (Clinical Value of the Encephalogram in the Processes of Cerebral Atrophy during the Involution Period). Robert Mallison. *Archives Internationales de neurologie, 67:* 205-206, 1948. Abstracted in *Psychological Abstracts, 23:* 486, 1949.

NORTHUP, D. W.—(See Stickney, J. C.)

NOWINSKI, W. W.—Influence of Anti-Organ Sera upon Metabolic Processes; Influence of Chick Anti-Brain Serum upon Oxygen Consumption of Chick-Brain Homogenates. *Texas Reports on Biology and Medicine, 7:* 230-236, 1949.

NUTRITION—Comparative Effects of Carbohydrate, Protein and Fat When Fed as Single Foods on Survival Time of Rats under Conditions of Accelerated Metabolism. H. A. Templeton and B. A. Ershoff. *American Journal of Physiology, 159:* 33-39, 1949.

Longevity of Tropical Rat Mites Kept without Food. J. A. Scott. *Journal of Parasitology, 35:* 434, 1949.

Minimum Tryptophane Requirement and Urinary Excretion of Tryptophane by Normal Adults. C. W. Denko and W. E. Grundy. *Journal of Laboratory and Clinical Medicine, 34:* 839-843, 1949.

New York State Nutrition Survey; a One-Day Study of Food Intake of Adults. M. Trulson, D. M. Hegsted, and F. J. Stare. *Journal of the American Dietetic Association 25:* 669-676, 1949.

Nutrition, Geriatrics, and the Physician. C. W. Crampton. *Nutrition Reviews, 7:* 289-290, 1949.

OBSTETRICS—Elderly Primigravid Women. L. M. Randall and J. C. Taylor. *American Journal of Obstetrics and Gynecology, 57:* 1210-1221, 1949.

OKIE, M. V.—Treatment of Menopause by Estradiol Pellet Implantation. *New York State Journal of Medicine, 49:* 1175, 1949.

OLD AGE ASSISTANCE—The Essential Nature of Old-Age Assistance. W. L. Painter. *Virginia Public Welfare, 27:* 4-5, 8-9. June, 1949.

Trends in Recipient Rates for General Assistance. E. T. Alling. *Social Security Bulletin, 12:* 9-11, June, 1949.

OPHTHALMOLOGY—The Etiology and Nonsurgical Treatment of Cataract. E. M. Blake. *North Carolina Medical Journal, 10:* 309-312, 1949.

Growth Curves and the Senescence of the Eye. F. P. Fischer. Abstracted in *Ophthalmologica, 117:* 379-380, 1949.

Senile Hyaline Scleral Plaques; Report of Three Cases. E. P. Drescher and J. W. Henderson. *Proceedings of the Mayo Clinic, :24* 334-336, 1949.

PAINTER, W. L.—The Essential Nature of Old-Age Assistance. *Virginia Public Welfare, 27:* 4-5, 8-9, June, 1949.

PAN, JU-SHU—Social Adjustment of Aged People. *Sociology and Social Research, 33:* 424-439, 1949.

PARK, W. W.—(See Lees, J. C.)

PAUL, G. A.—Summary of Physical Findings of Employees over Sixty Years of Age. *Industrial Medicine and Surgery, 18:* 360-364, 1949.

PEMBERTON, J.—Return to Work of Elderly Male Patients. *British Medical Journal:* no. 4622, 306-308, 1949.

PENSIONS—Battle for Pensions. Anon. *Life, 27:* 41-45, Oct. 17, 1949.

Bigger and Better Pensions? Anon. *United States News and World Report, 27:* 29-30, Sept. 30, 1949.

Pension Politics in California. C. McWilliams. *Nation, 169:* 320-322, Oct. 1, 1949.

Pensioning Your Employees. H. K. Kramer. *Best's Insurance News, 50:* 71-72, Aug., 1949.

Security or Delusion? Unsound Pension Plans Dry up Benefit Sources. D. C. Bronson. *Fiduciary Publication, Inc.* (New York), 1949, 6 pages.

Your Pension Prospects: Going Up. Anon. *United States News and World Report, 27:* 39-40, Aug. 26, 1949.

PHILLIPS, F.—The Aging Man in the Modern World. F. Phillips. *Medical Journal of Australia, 2:* 249-251, 1949.

PHYSIOLOGY—Heat Reaction States in the Aged. L. Friedfeld. *Geriatrics, 4:* 211-216, 1949.

POPKIN, Z.—Widows and the Perilous Years. *Harper's Magazine, 199:* no. 1129, 69-75. 1949.

PRITCHARD, J. A.—Erythrocyte Age and Cholinesterase Activity. *American Journal of Physiology, 158:* 72-76, July, 1949.

PSYCHIATRY—Psychopathology and the Concept of Humanity on Aging. L. Van der Horst. *Confinia neurologica, 9:* 177-192, 1949.

PSYCHOLOGY—Adjustment to Age. W. M. Johnson. *Medical Annals of the District of Columbia, 17:* 664-701, 1948. Abstracted in *Psychological Abstracts, 23:* 595, 1949.

Age and Mental Alertness. Anon. *Hygeia, 27:* 446, July, 1949.

L'Age et le Talent (Age and Talent). G. Revesz. Abstracted in *Psychological Abstracts, 23:* 526, 1949.

Color Vision and Age. M. L. Boice. *American Journal of Psychology, 61:* 520-526, 1948.

Factors in the Adult Achievement of Gifted Men. L. Terman. Abstracted in *Pyschological Abstracts, 23:* 526, 1949.

Note on the Shifts of Interests with Age. E. L. Thorndike. *Journal of Applied Psychology, 33:* 55, 1949. Abstracted in *Psychological Abstracts, 23:* 461, 1949.

Older Parent-Adult Child Counseling. J. Antman. *Jewish Social Service Quarterly, 25:* 334-340, 1949. Abstracted in *Psychological Abstracts, 23:* 525, 1949.

Sex Life of the Middle Aged. Le Mon Clark. *Marriage and Family Living, 11:* 58-60, 1949. Abstracted in *Psychological Abstracts, 23:* 595, 1949.

Skill and Age. A. T. Welford. *Advancement of Science, 6:* 20, April, 1949.

Some Examples of Creative Achievement during Later Maturity and Old Age. H. C. Lehman. *Journal of Social Psychology, 30:* 49-79, 1949.

RANDALL, J. H., JR.—Salute to John Dewey—"Going on 91." *Survey, 85:* 509-510, 1949.

RANDALL, L. M.—and J. C. Taylor. Elderly Primigravid Women. *American Journal of Obstetrics, and Gynecology, 57:* 1210-1221, 1949.

RAU, G. C.—Age, Body Weight and Blood Hypertensinogen. *American Journal of Physiology, 158:* 401-402, 1949.

RECREATION—Our Own Future; Clubs for Older Persons to Live and Work Together. L. C. Rosett. *Catholic World, 169:* 430-439, 1949.

REHABILITATION—The Medical Care and Rehabilitation of Elderly People. M. Warren. *Advancement of Science, 6:* 18, April, 1949.

RESEARCH—Newly Established Laboratory. Anon. *American Journal of Sociology, 55:* 97-98, July, 1949.

RETIREMENT—Before Retiring, Stop, Look, Listen! Reply. A. D. Albert, Jr. *American Home, 42:* 10, June, 1949.

Ready to Retire? Anon. *Business Week:* 124, April 30, 1949.

Retirement Doesn't Have to Be Exile. M. T. Bloom. *Rotarian, 75:* 15, Sept., 1949.

REVESZ, G.—L'Age et le Talent (Age and Talent). Abstracted in *Psychological Abstracts, 23:* 526, 1949.

REYNOLDS, H.—(See Spicer, S. S.)

RHEUMATIC DISEASE — Chronic Rheumatic Disease in the Elderly. T. H. Howell. *Rheumatism, 5:* 82-85, 1949.

RIERA DOMÉNESH, A.—(See Simarro Puiz, J.)

ROGERS, M. P.—Priscoline and Arteriosclerotic Peripheral Vascular Disease. *Geriatrics, 4:* 315-319, 1949.

ROSETT, L. C.—Our Own Future; Clubs for Older Persons to Live and Work Together. *Catholic World, 169:* 430-439, 1949.

ROSSITER, R. J.—(See Johnson, A. C.)

RUDERFER, M.—Concept of Action as a Measure of Living Phenomena. *Science, 110:* 245-252, 1949.

SANDERSON, W. A.—Old Age as a Social Problem. *Advancement of Science, 6:* 19, April, 1949.

SCHENDEL, G.—To the County Home to Die; Indiana's Allen County Institution. *Collier's, 124:* 22-23, Oct. 8, 1949.

SCHIEBEL, H. M.—and D. Moise. Appendicitis in Old Age; a Clinical Study of 53 Cases in Patients over 60 Years of Age. *North Carolina Medical Journal, 10:* 355-361, 1949.

SCHNABEL, T. G.—(See Fetter, F.)

SCOTT, J. A.—Longevity of Tropical Rat Mites Kept without Food. *Journal of Parasitology, 35:* 434, 1949.

SEKAR, C. C.—The Effect of the Change in Mortality Conditions in an Age Group on the Expectation of Life at Birth. *Human Biology, 21:* 35-46, 1949.

SELYE, H.—(See Timiras, P. S.)

SHELDON, J. H.—The Care of Old Age in the Home. *Medical Practitioner, 129:* 398-400, 1948. Abstracted in *Psychological Abstracts, 23:* 461, 1949.

SHORTELL, J. H.—(See Fahey, R. J.)

SILBERBERG, M.—and R. Silberberg. Role of Age in Estrogen-Induced Lymphoid Tumors of Mice. *Archives of Pathology, 47:* 340-349. 1949.

SILBERBERG, R.—(See Silberberg, M.)

SILVERSTEIN, M. E.—(See Nagamatsu, G.)

SIMARRO PUIZ, J.—and A. Riera Doménesh. Paralisis General y Edad (Revisiones de conjunto). *Revista Clínica Española, 33:* 311-317, 1949.

SISON, A. G.—and G. F. Austria. The Influence of American Occupation on the Life Span of the Filipino and on the Incidence of Degenerative Diseases. *Acta medica philippina, 5:* 1-8, 1949.

SMITH, C. A. B.—(See Harris, H.)

SMITH, W. M., JR.—So Old Nobody Wants You. *Journal of Home Economics, 41:* 308-310, 1949.

SOCIOLOGY — Social Adjustment of Aged People. Ju-Shu Pan. *Sociology and Social Research, 33:* 424-439, 1949.

SPICER, S. S.—and H. Reynolds. Individual and Age Variation in Methemoglobin Formation and Reduction in Rabbit Erythrocytes. *American Journal of Physiology, 159:* 47-56, 1949.

STARE, F. J.—(See Trulson, M.)

STEINCROHN, P. J.—Exercise After 40? Forget It! *Science Digest, 26:* 1-6, Nov., 1949.

STICKNEY, J. C.—E. J. Van Liere, and D. W. Northup. A Comparison of the Propulsive Motility of the Small Intestine in Adult Dogs and Pups. *American Journal of Physiology, 158:* 201-204, 1949.

STIEGLITZ, E. J.—Aging and Chronic Illness (editorial). *Geriatrics, 4:* 320-322, 1949.

STØMNAES, O.—The Production of Dominant Lethals with X-Rays in Aged Drosophila Melanogaster Sperm. *Genetics, 34:* 462-474, 1949.

SUESS, H. E.—Zur Frage nach dem Alter der Elements. *Experientia, 5:* 278, 1949.

SURGERY—Anesthesia and Surgery in Patients of Advanced Age. P. H. Lorhan. *Current Researches in Anesthesia and Analgesia,, 28:* 190-202, 1949.

Appendicitis in Old Age; A Clinical Study of 53 Cases in Patients over 60 Years of Age. H. M. Schiebel and D. Moise. *North Carolina Medical Journal, 10:* 335-361, 1949.

The Grave Prognosis of Appendicitis in the Aged. D. D. Collins. *Annals of Western Medicine and Surgery, 2:* 13 pages, 1949.

Surgery of the Aged, S. M. Copland. *New Orleans Medical and Surgical Journal, 101:* 593-597, 1949.

A Technique for Division and Suture of the Patent Ductus Arteriosus in the Older Age Group. N. E. Freeman and F. H. Leeds. *Surgery, 26:* 103-108, 1949.

TAYLOR, J. C.—(See Randall, L. M.)

TEMPLETON, H. A.—and B. A. Ershoff. Comparative Effects of Carbohydrate, Protein and Fat When Fed as Single Foods on Survival Time of Rats under Conditions of Accelerated Metabolism. *American Journal of Physiology, 159:* 33-39, 1949.

TERMAN, L.—Factors in the Adult Achievement of Gifted Men. Abstracted in *Psychological Abstracts, 23:* 526, 1949.

THOMSON, A. P.—Problems of Aging and Chronic Sickness. *British Medical Journal:* no. 4621, 254-250, no. 4622, 300-305, 1949.

THORNDIKE, E. L.—Note on the Shifts of Interest with Age. *Journal of Applied Psychology, 33:* 55, 1949. Abstracted in *Psychological Abstracts, 23:* 461, 1949.

TIMIRAS, P. S.—C. Faribault, and H. Selye. The Influence of the Age Factor upon the Brain Lesions Produced by Prolonged Overdosage with Desoxycorticosterone Acetate. *Geriatrics, 4:* 225, 235, 1949.

TINTERA, J. W.—and H. W. Lovell. Endocrine Treatment of Alcoholism. *Geriatrics, 4:* 274-280, 1949.

TISSUE CULTURES—Inorganic Aging of the Plasma Layer of Tissue Cultures. J. H. Hanks. *Proceedings of the Society for Experimental Biology and Medicine, 71:* 313-315, 1949.

TRAUT, E. F.—J. B. Carter, S. H. Gumbiner, and R. N. Hench. Bacterial Endocarditis in the Elderly. *Geriatrics, 4:* 205-210, 1949.

TRULSON, M.—D. M. Hegsted, and F. J. Stare. New York State Nutrition Survey; a One-Day Study of Food Intake of Adults. *Journal of the American Dietetic Association, 25:* 669-676, 1949.

TUBERCULOSIS — Tuberculosis Among the Aged. J. A. Myers. *Bulletin of the Chicago Medical Society, 51:* 1071-1075, 1949.

VAN LIERE, E. J.—(See Stickney, J. C.)

VISCHER, A. L.—Aufgaben und Begrenzung der Altersforschung. *Bulletin der Schweizerischen Akademie der Medizinischen Wissenschaften, 5:* fasc. 4, 290-301, 1949.

WARREN, M.—The Medical Care and Rehabilitation of Elderly People. *Advancement of Science, 6:* 18, April, 1949.

WELFORD, A. T.—Skill and Age. *Advancement of Science, 6:* 20, April, 1949.

WILSON, J. A.—Old Age. *Connecticut Medical Journal, 13:* 531-533, 1949.

YAKOVLEV, P. I.—Loss of Consciousness and Convulsions in Middle-Aged Patients. *Connecticut Medical Journal, 13:* 521-527, 1949.

YOFFEY, J. M.—and J. S. Baxter. Histochemical Changes in the Suprarenal Gland of the Adult Male Rat. *Journal of Anatomy, 83:* 89-98, April, 1949.

ZEMAN, F. D.—The Medical Significance of Our Aging Population. *Public Health Nursing, 41:* 381-384, 1949.